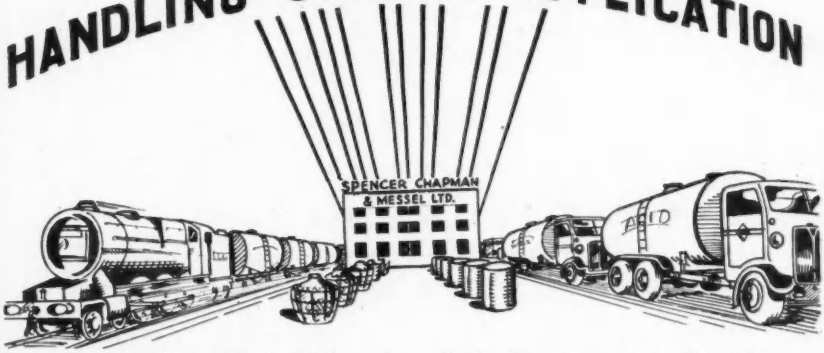
ECHNOLOGY DEPT.
PUBLIC LIBRARY
JAN 21 1952
DETROIT

The Chemical Age

VOL LXV 29 DECEMBER 1951 No 1694

ACIDS

HANDLING - STORAGE - APPLICATION



It is part of our service to advise anyone on the handling, storage and application of Corrosive Acids. Our advice is seasoned by 80 years' experience of manufacturing commercial and pure acids for every type of industry all over the world.

OLEUM - SULPHURIC - BATTERY ACID - HYDROCHLORIC
NITRIC - DIPPING ACID - DISTILLED WATER

supplied in any quantity.

Happiness and Prosperity to All

During 1952

SPENCER CHAPMAN & MESSEL, LTD.

33, CHANCERY LANE - LONDON W.C.2. Works: Silvertown E.16. Telephone: HOLborn 0372 (3 lines)

CRUICKSHANK'S

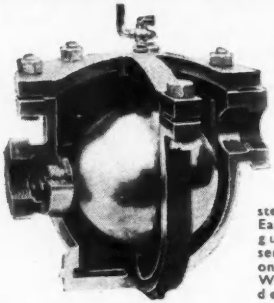
for

COPPER ACETATE
COPPER ACETO-ARSENITE
COPPER CARBONATE
COPPER CHLORIDE
COPPER FLUOBORATE
COPPER NITRATE
COPPER OXIDE
COPPER OXYCHLORIDE
COPPER SILICOFLUORIDE

R. CRUICKSHANK, LTD.

Camden Street, Birmingham, 1
Telephone : B'ham Central 8553 (6 lines)
Grams & *Cables* : Cruickshank Birmingham.

"Simplicity"
STEAM TRAPS



cannot jam or blow steam. Unique in design, foolproof in operation. 'Simplicity' Steam Traps have only one moving part—a free floating stainless steel sphere. Each trap is guaranteed; send for a trap on trial. Write for fully descriptive pamphlet.

Agents and Stockists in many countries, the names of whom we will gladly send on application.

THE
KEY ENGINEERING CO., LTD.
4 QUEEN VICTORIA STREET, LONDON, E.C.4
and TRAFFORD PARK, MANCHESTER.
Telephone : CITY 1185/6. TRAFFORD PARK 1903.

KESTNER Laboratory and Pilot Plant EQUIPMENT

THE KESTNER LABORATORY STIRRER is a remarkably efficient apparatus indispensable to every laboratory for stirring, mixing and agitation, operated from electric light supply, direct drive without gears, with variable speed control, silent in operation and enclosed type non-metallic switch. Suitable for attaching to standard laboratory retort stand and clamp, or independent support. Write for Leaflet 233b.

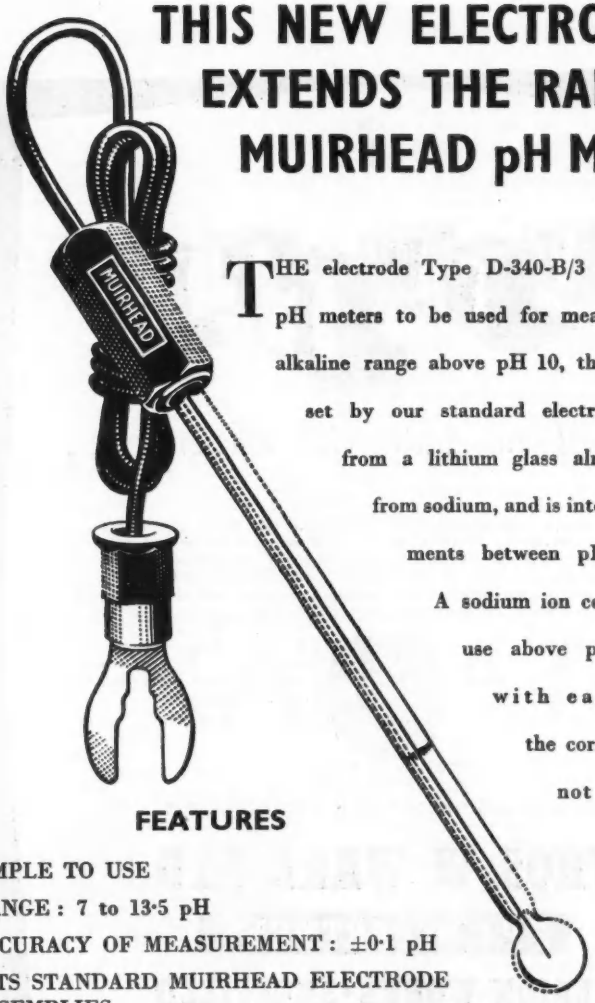
THE KESTNER LABORATORY EVAPORATOR has all the unique features of the full-size Kestner Patent Multi-Circulation Evaporator. This small Evaporator is so arranged that it may be used as a single, double or triple circulating unit, making it particularly suitable for experimental work. Write for Leaflet 259.

We also have available a comprehensive range of laboratory size film driers, fractionating stills, vacuum ovens, Infra Red apparatus ideally suited to pilot plant, investigation and for educational purposes.

THE KESTNER LABORATORY SPRAY DRIER produces a dry powdered product of uniform texture in one operation from solutions or suspensions. It is specially arranged for easy cleaning and is suitable for handling a wide range of products. Each unit is complete with heater, fan, dust collector, driving motor, and all necessary equipment. Write for Spray Drier Leaflet 264.

KESTNER'S
Chemical Engineers, 5 GROSVENOR GARDENS, LONDON, S.W.1

THIS NEW ELECTRODE EXTENDS THE RANGE OF MUIRHEAD pH METERS



THE electrode Type D-340-B/3 enables Muirhead pH meters to be used for measurements in the alkaline range above pH 10, the limit previously set by our standard electrode. It is made from a lithium glass almost entirely free from sodium, and is intended for measurements between pH 7 and pH 13·5. A sodium ion correction curve for use above pH 12 is supplied with each electrode; the correction factor does not exceed 0·3 pH.

FEATURES

SIMPLE TO USE

RANGE : 7 to 13·5 pH

ACCURACY OF MEASUREMENT : ±0·1 pH

FITS STANDARD MUIRHEAD ELECTRODE ASSEMBLIES

MUIRHEAD & Co., LTD.

PRECISION ELECTRICAL INSTRUMENT MAKERS

BECKENHAM · KENT · ENGLAND

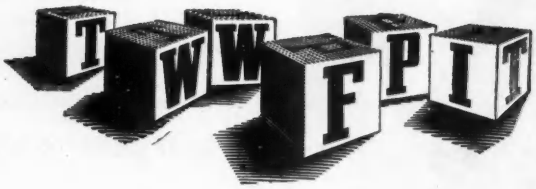
PRECISION MUIRHEAD ELECTRICAL INSTRUMENTS

Phone: BEC 0041 Telegrams & Cables: MUIRHEADS ELMERS-END

35C

A

?



Grouped for industrial efficiency . . .

WTPIFW doesn't mean a thing to us, nor does PIWTFW ! TWWFPI is, however, the answer to the hundred and one problems involved in transportation, and planned installation or plant and machinery for every kind of industry—briefly the service given by THOS. W. WARD'S FACTORY PLANNING and INSTALLATION Department.

This service isn't child's play by any manner of means. It calls for much more than the simple rearrangement of set units ; it requires specialised equipment, transport, personnel and above all, a wide knowledge of every aspect of industry and engineering Whenever factory reorganisation is a problem TWWFPI can tackle the whole job efficiently.

Write for the booklet "FACTORY PLANNING AND INSTALLATION"

THOS. W. WARD LTD

F P I DEPARTMENT

ALBION WORKS · SHEFFIELD

PHONE : 26311 (22 lines) *GRAMS* : "FORWARD, SHEFFIELD"

LONDON OFFICE : BRETTENHAM HOUSE, LANCASTER PLACE, STRAND, W.C.2

FPI/4

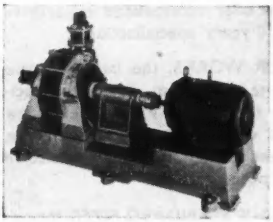
INDEX TO ADVERTISERS IN THIS ISSUE

	Page
Alcock (Peroxide), Ltd.	viii
Bamag, Ltd.	881
Bowmans Chemicals, Ltd.	xii
British Acheson Electrodes, Ltd.	iii
British Tar Products, Ltd.	xii
Brough, E. A. & Co., Ltd.	viii
Classified Advertisements	886, xiii, xiv
Cole & Wilson, Ltd.	xiv
Cruickshank, R., Ltd.	Cover ii
Cygnet Joinery, Ltd.	xv
Feltham, Walter H., & Son, Ltd.	xvi
Foxboro-Yoxall, Ltd.	v
Gallenkamp, A., & Co., Ltd.	xi
Gas Council, The	vi
George, W. & J., & Becker, Ltd.	883
Guest Industrials, Ltd.	xiv
Haughton's Metallic Co., Ltd.	xvi
Kestner Evaporator & Eng., Co., Ltd.	Cover ii & 885
Key Engineering Co., Ltd., The	[Cover ii
Leeds & Bradford Boiler Co., Ltd. (The)	xiv
Leigh & Sons Metal Works	xvi
Lennox Foundry Co., Ltd.	xvi
Lord, John L.	Cover iv
Metropolitan-Vickers Electrical Co., Ltd.	Cover iv
Metway Electrical Industries, Ltd.	xv
Mitchell, L. A., Ltd.	xiv
Muirhead & Co., Ltd.	i
Negretti & Zambra, Ltd.	885
Powell Duffryn Carbon Products, Ltd.	Cover iii
Propane Co., Ltd., The	vii
Simon, Richard, & Sons, Ltd.	iv
Spencer Chapman & Messel, Ltd	Front Cover
Stewart & Gray, Ltd.	iv
Thermal Syndicate, Ltd., The	x
Ward, Thomas W., Ltd.	ii
Wilkinson, James & Son, Ltd.	xvi
Wilkinson Rubber Linatex, Ltd.	ix

KARBATE

TRADE MARK

PUMPS



"Karbate" Model A Centrifugal Pumps, with trouble-free rotary seal, are extensively used in handling practically all corrosive fluids, including mixtures of acids, such as HC_1 and H_2SO_4. All gaskets are confined and there is no chance for metallic contamination of liquid. Sizes shown in table below.

Size	Port Sizes		Normal Rating			
			1735 r.p.m.		1150 r.p.m.	
	Suction	Discharge	G.P.M.	Head in Feet	G.P.M.	Head in Feet
Model A—No. 3	2"	1½"	55	57	50	22
Model A—No. 4	2"	1½"	100	107	80	44
Model A—No. 5	4"	2"	220	52	180	22

CONSULT—

BRITISH ACHESON ELECTRODES LTD.,

Grange Mill Lane, Wincobank, Sheffield.

Telephone : Rotherham 4836 (3 lines). *Telegrams :* Electrodes, Sheffield.

ESCOL

THE SYMBOL OF SERVICE AND QUALITY

Vitreous Enamels

Vitreous Enamelling

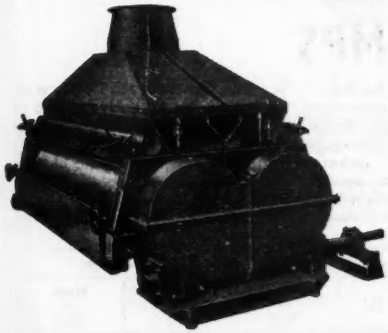
REFRACTORY COATINGS ON METALS

Telephone:
MITcham 1634 (5 lines).

Telegrams:
Escol, Toot, London.

STEWART & GRAY LTD.,
Paisley Works, Swains Road,
Tooting Junction, S.W.17.

MULTITUBULAR DRIERS
ROLLER FILM DRIERS
FLAKERS AND COOLERS



We offer accumulated experience of 50 years' specialization.

OUR WORKS, the largest in the United Kingdom devoted especially to DRYING MACHINERY, are laid out and equipped with the latest plant for this particular purpose.

MANY STANDARD SIZES including LABORATORY MODELS.

We have test plants always available

RICHARD SIMON & SONS, LTD.
PHŒNIX WORKS, BASFORD, NOTTINGHAM

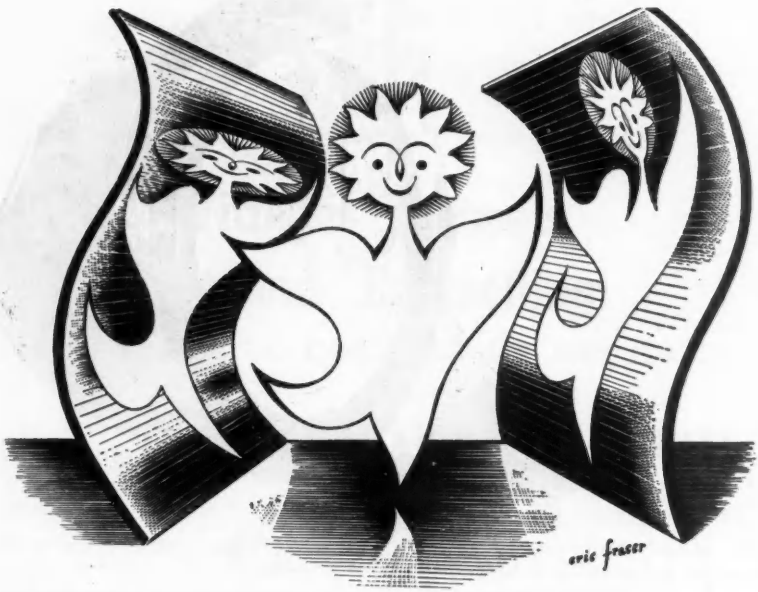
Thirty years of development and manufacturing experience enable Foxboro to offer industry, Recorders and Controllers for temperature, pressure, humidity, liquid level, flow and other process measurements fully certified and guaranteed. CERTIFIED for accuracy and response—GUARANTEED for functional reliability . .

fait accompli.

FOXBORO-YOXALL LTD

LOMBARD ROAD, MERTON, LONDON, S.W.19

British made instruments



'FLEXIBLE' IS MY MIDDLE NAME! says Mr. Therm

The gas and gas-heated equipment that Mr. Therm brings in his train are amazingly flexible in their applications to all sorts of heating problems. What other fuel but gas could give you a tiny—but steady—pin-point of flame or full heat the instant you want it? And gas can be controlled at the flick of a finger—or can be completely automatic if required. It needs no storage space, is smokeless and ash-free, and works unfailingly for you with remarkable efficiency. No wonder Mr. Therm is to be found hard at work in so many industries!

Mr. Therm is in the pink

. . . and in a lot of other colours, too! He's got the job of heating the battery of reaction vessels—each of 220 gallons capacity—used in the production of aniline dye at the works of Williams (Hounslow) Ltd. Town gas is used throughout for heating. The specially designed internally insulated housings hold cast-iron pans which are enamelled inside, and fitted with belt-driven agitating mechanism.

MR. THERM BURNS TO SERVE YOU THE GAS COUNCIL · 1 GROSVENOR PLACE · S W 1

Prime Offer* Merchants

IMPORTANT ANNOUNCEMENT

An organized and efficiently operating Sales Division is equipped and ready to handle the commercial details of any transactions we undertake for **YOU** as for our many other satisfied customers.

Certain items are now being contracted for, including :—

TRICHLORETHYLENE
OXALIC ACID
CARBON TETRACHLORIDE
PHTHALIC ANHYDRIDE
ULTRAMARINE BLUES
MILORI BLUES
LITHOPONE
BEECHWOOD CHARCOAL
PERCHLORETHYLENE
META PARA CRESOL
BUTYL ACETATE
METHYL ACETATE
ISOAMYLACETATE
METHANOL
HEXANETRIOL
GLYCOLS
TRIPHENYLPHOSPHATE
CHLORALHYDRATE
LACTIC ACID
DIMETHYLAMINE
MERSOL
TRIETHYNOLEAMINE
SACCHARIN

* *Offers only made where we have direct control from Producer to End User.*

The Propane Company Limited

8 HEDDON STREET, LONDON, W.1

Telephone No : GROsvenor 5301 (10 lines).
Telegrams : Propanco, Piccy, London.
Cables : Propanco, London.

We will be pleased to receive your enquiries for any items you are having difficulty in obtaining.

PE.3.dm.

FOR
ALL CLASSES
OF DETERGENT
AND BLEACHING
OPERATIONS

SODIUM METASILICATE
SODIUM SESQUISILICATE
SODIUM ORTHOSILICATE
HYDROGEN PEROXIDE

(ALL STRENGTHS)

SYNTHETIC AND ALL-PURPOSE DETERGENT COMPOUNDS

SEND PARTICULARS OF YOUR DETERGENT AND BLEACHING PROBLEMS TO

ALCOCK (PEROXIDE) **LTD**
LUTON - BEDS
Telephone : LUTON 4900 (3 lines)
Telegrams : Peroxide, Luton

Brough's
DRUMS

are easy pouring

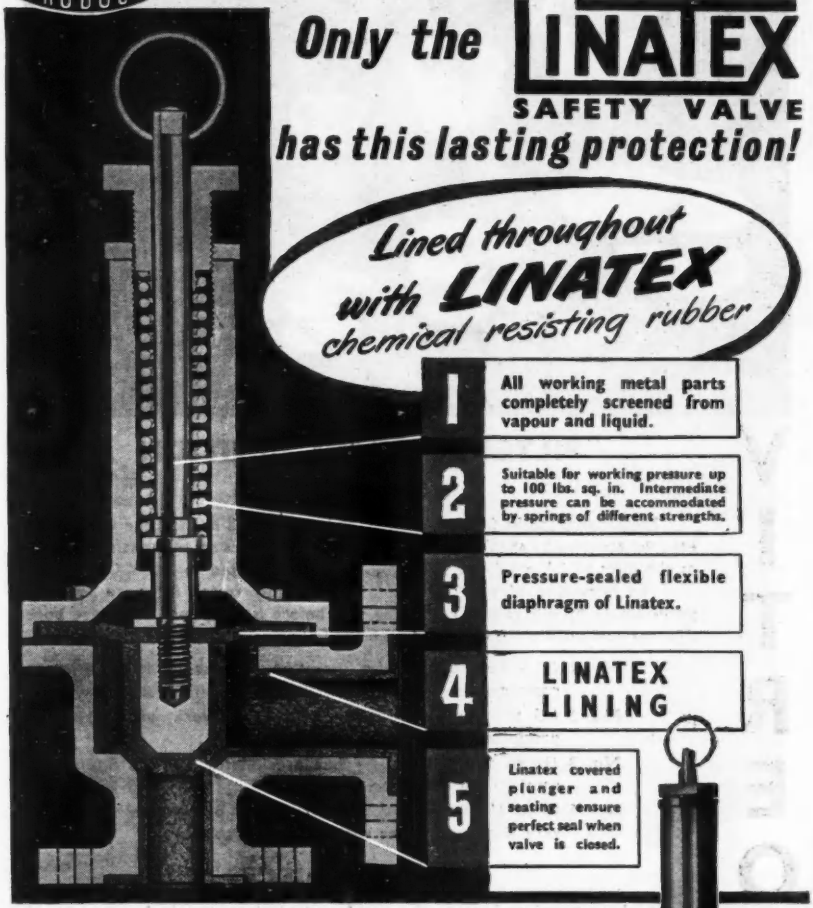
LIVERPOOL 8 & SPEKE
Telephone: ROYAL 3031-3
Telegrams: SUPERDRUM

WILKINSON PRODUCT

MAKING RUBBER SERVE INDUSTRY

Only the LINATEX SAFETY VALVE has this lasting protection!

Lined throughout with LINATEX chemical resisting rubber

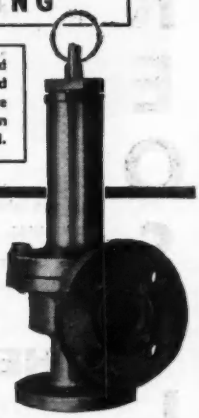

1
All working metal parts completely screened from vapour and liquid.
2
Suitable for working pressure up to 100 lbs. sq. in. Intermediate pressure can be accommodated by springs of different strengths.
3
Pressure-sealed flexible diaphragm of Linatex.
4
LINATEX LINING
5
Linatex covered plunger and seating ensure perfect seal when valve is closed.

The LINATEX SAFETY VALVE HAS PROVED ITS WORTH TO INDUSTRY

The effects of corrosive liquids and vapours upon the metal of ordinary safety valves are costly—but upon Linatex Safety Valves they have no effect at all. All interior metal is positively and scientifically isolated by Linatex chemical resisting rubber. The longest possible working life of the valve is thus ensured. Without a doubt, safety is long-lasting with Linatex Safety Valves—available in ¾", 1", 1½", 2" and 3" sizes. They pay for themselves with the money they save on replacement costs.

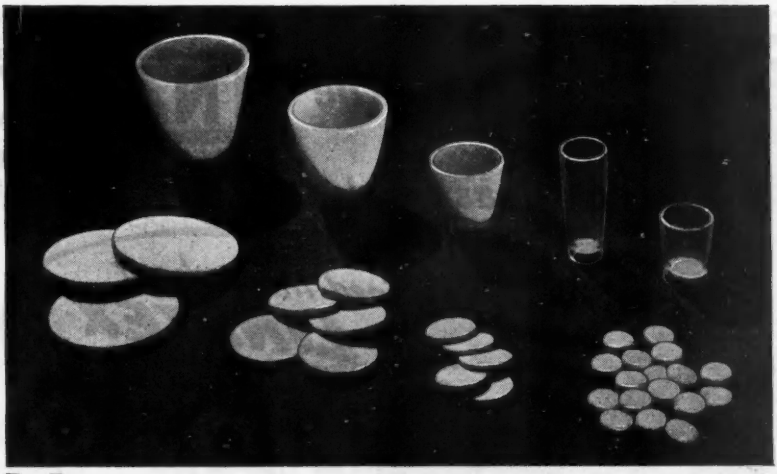
These valves are proving popular as relief valves in pumping circuits on chemical plant.

Write for further details of these valves, or ask our Resident Engineer for your district, to call and discuss any problem you may have.



WILKINSON RUBBER LINATEX LTD., FRIMLEY RD., CAMBERLEY, SURREY. *Tel. Camberley 1595.*
Also in Canada, Australia, South Africa, India, U.S.A., Belgium, Holland, Portugal, Scandinavia, Malaya, etc.
Also makers of Linatex, The Linatex Ball Mill, The Linatex Pump, Linatex tank & pipe linings and Flexatex Hose.

V2



VITREOSIL

FILTERING AND IGNITION CRUCIBLES

Precipitates can be filtered, ignited, and weighed all in the same vessel with ease and accuracy by even semi-trained staff. The crucibles are of the same material as the discs which are fused to them, and can be ignited to 1,000° C.

The filter disc of every crucible is thoroughly tested for pore size and permeability by our expert examining staff before being passed. Average pore size and applications are identified with the following grades of porosity :—

No. 1 (90 to 150 microns)—for filteration of coarse precipitates, coarse gases, and coarse grain material.

No. 2 (40 to 90 microns)—for preparative work with crystalline precipitates.

No. 3 (15 to 40 microns)—for fine precipitates, fine gas filters, and retention of fine material.

No. 4 (5 to 15 microns)—for analytical and preparative work with very fine precipitates such as barium sulphate.

POROUS DISCS

in the above-mentioned porosities can be supplied separately for customers' own uses.

Other apparatus incorporating VITREOSIL porous discs can be supplied to specification, and Grote-Krekeler combustion tubes are available.

WRITE FOR DETAILS OF SIZES AND PRICES

THE THERMAL SYNDICATE LTD

Head Office: WALLSEND, NORTHUMBERLAND

London Office: 12-14, OLD PYE STREET, WESTMINSTER, S.W.1

Gallenkamp
REGD.

LABORATORY OVEN

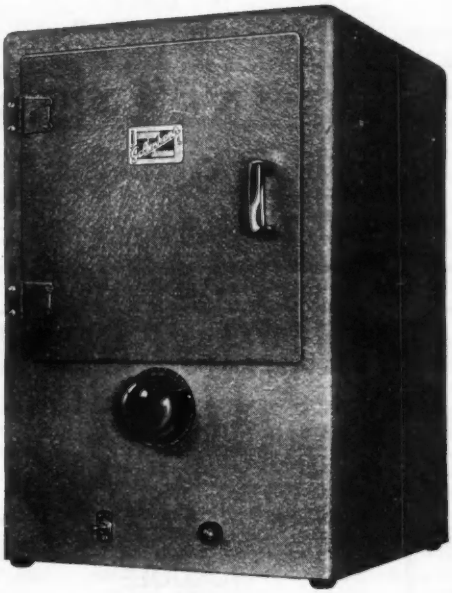
FOR GENERAL PURPOSES

Maximum Temperature 180° C.

Designed to satisfy the need of many customers for an inexpensive general purpose drying oven or sterilizer, with reasonably accurate temperature control.

Features

1. **Maximum operating temperature 180° C.**
2. **Clean modern design.**
3. **Constructed in aluminium throughout.**
4. **Convenient temperature regulation by "Gallenkamp - Sunvic" thermostat.**
5. **Thermostat sensitive to ± 0.5° C.**
6. **Temperature deviation ± 1° C.**



No. 7840

Internal working space 12″ × 12″ × 12″ overall dimensions 22″ × 14½″ × 14″
Load 650 watts. Suitable for A.C. and D.C. supplies.

Full particulars sent on request

A. GALLENKAMP & CO. LTD.

Manufacturers of Modern Laboratory Equipment and Scientific Apparatus

17-29 SUN STREET, LONDON, E.C.2

Telephone : BIShopsgate 5704 (7 lines) *Telegrams : Gallenkamp, Ave., London*

LACTIC ACID
SULPHONATED OILS
TANNERS MATERIALS

BOWMANS CHEMICALS LTD.
MOSS BANK WORKS, WIDNES, LANCS.

Telegrams
BOWMANS · WIDNES

Telephone
WIDNES 2277

BRITISH TAR PRODUCTS
LIMITED

Makers of

PYRIDINE
PHENOL
CRESYLIC ACIDS
META-CRESOL
NAPHTHALENE
TOLUOLE
ANTHRACENE OIL
SOLVENT NAPHTHA
XYLOLE
ORTHO CRESOL
METHYL CYCLOHEXANOL
CYCLOHEXANOL

SALES OFFICE :
418A GLOSSOP ROAD, **SHEFFIELD, 10**
Telephone: 60078-9
Telegrams : "CRESOL, SHEFFIELD 10"

The
Chemical Age

Established 1919

The Weekly Journal of Chemical Engineering and Industrial Chemistry

BOUVERIE HOUSE 154 FLEET STREET LONDON E.C.4
Telegrams: ALLANGAS FLEET LONDON · Telephone: CENTRAL 3212 (26 lines)

Volume LXV 29 December 1951 Number 1694

The Price of Words

TODAY it sounds invidiously like special pleading to draw attention to hardships caused by one specific price rise. Nevertheless, we should do the future of this country less than justice were we to adopt a 'couldn't-care-less' attitude towards the leaping costs of book and journal publication. During 1951 paper has all but doubled its price; the cost of book binding has risen by about 30 per cent, and that of printing by 25 per cent. These are hard facts. All publishers must face them whether they issue fiction for lending libraries, pulp-paper extravaganza for side-street book-stalls, text-books for schools and universities, or journals reporting the front-line progress of science.

The prolific reader of fiction must either pay more for it and cut down on something else, or even consider re-reading some of the older books instead of the latest ones. The young scientist is very differently placed. Scientific books suffer more than any other kind from the wastage of obsolescence; at the present pace of research, text-books need to be revised more extensively and more frequently than was the case a generation or two ago. Students rarely possess adequately lined pockets; since the war the economic blizzard has particularly hit the middle and professional classes, and this has inevitably enlarged the proportion of poor students at our universities. The young graduate, feeling his way towards a career, has no sudden accession to wealth and the tax collector does not ease his PAYE demands because the graduate is entering the world of pay-packets several years later than most. Yet at this stage in a scientist's education technical journals represent the best means of linking the general knowledge he already possesses with the special tasks ahead of him. It is upon these two classes, the student and the young graduate, that rising costs of publication will fall with the most severity. Yet they are the very people who in fact derive most from books and journals, the virgin soil that responds the most to cultivation.

There is no way of evading sharp price rises for books and periodicals in 1952. Indeed, if bigger prices cause reductions in demand, prices will go higher still for the production cost per copy increases with a fall in the total number run off. Therefore, one of the urgent tasks of organised science for the new year must be to investigate all possible ways and means of minimising the effects of rising

prices for students and young graduates. It is possible that there is an arguable case for a subsidy for books of a genuinely educational nature, but as a nation we are already dangerously subsidised. Subsidies, like suppers with the Devil, need particularly long spoons. Successive governments since 1941 have helped the cause of books in the best way they could, by protecting them from the new device of purchase tax. How very much worse the position would be already if this tax, even at a low rate, applied to books!

Is no economy possible in the costs of text-book production? Are our traditional standards too high for today's economics? Cloth and board bindings might, for example, be replaced by stiff paper covers. This would be a sad change but it has had to be faced by other European countries in the past. Some types of technical books might be produced in two standards of binding, thus giving the students a chance of making a small economy. Should there not be some degree of return to the wartime austerity standards of presentation to save paper? In the book world there is general reluctance to this reversion. Admittedly for works of fiction the argument against smaller print and margins is powerful—book sales would probably fall at home and export sales would certainly be damaged. Does this apply to books for students? A quotation from an article by Murray Watson in 'The Battle of the Books' (Wingate, 1947) seems relevant: 'The reader anxious to secure a certain book will not seriously object to a wartime austerity in its format, on the principle that half a loaf is better than no bread.'

The scientific journals that are devoted to original papers are largely produced by the societies and the problem of price is closely linked with that of annual subscriptions. It seems to be generally considered that subscriptions are already high enough. If this is accepted, then the societies must obtain greater financial help from industry and also economise in their use of paper. It is sometimes said, perhaps over-cynically, that too many papers are published. It might be practicable to publish certain papers in condensed forms with full versions in cyclostyled form available at a nominal cost on application. It cannot be denied that some original papers are of value only to a most limited number.

Admittedly this all makes sorry reading at the end of a year but the dangers to our standards of scientific publication will be reduced according to the wisdom with which we face them. If some sacrifices in presentation are required to keep the price of scientific words within the reach of future scientists, no one should stand in their way. We are facing a new pattern of economic crisis, exemplified recently by the smaller farmers who found de-subsidised fertilisers too dear to buy. We can no more let books get too dear for students than have our plumbers unable to buy their tools.

On Other Pages

Moving Burden Coal Gasification . . 855
Control of Glasshouse Pests and Diseases . . 860
Constitutional Study of the Sapogenins 861
Indian Newsletter . . 865
German Chemical Production Improved . . 867
Chemical Exposition in New York . . 869
Chemist's Bookshelf . . 872
Overseas News Items . . 873
Home News Items . . 874
Personal . . 875
Publications and Announcements . . 876
British Chemical Prices . . 877

The annual subscription to THE CHEMICAL AGE is 35s. Single copies, 9d.; post paid, 1s.: SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3954/5). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784-5). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers, Limited.

Notes & Comments

Under or Over the Eight

IT is clear from the 15 December issue of *Chemistry and Industry* that when the Nutrition Panel of the SCI Food group met last October a very good time was enjoyed by all. Dr. R. P. Cook's paper on 'The Physiology and Psychology of Alcohol' provoked as much discussion as would alcohol itself. Indeed, the Panel Recorder's terse comment that 'many members took part and some personal experiences and views were related' suggests that this, above all, was one of the chemical meetings of 1951 that should not have been missed. At the end of the last war Sir Jack Drummond, then Scientific Adviser to the Ministry of Food, pointed out that beer had usefully contributed to the nation's total intake of vitamin B; on this morally confused subject, alcohol, the opinion of biochemistry has an objective record.

The Scientist's Role

ONE of the problems raised in the discussion is perhaps appropriate at this festive season. Why is the alcohol in mixed drinks more potent than a similar amount of alcohol in the same class of drink. It was suggested that the intoxicating effect of the essential oils and esters may contribute towards this 'lost week-end' problem. Perhaps the various oils and esters are synergists for alcohol's toxicity in excess. Yet this is a small problem compared with the central problem which Dr. Cook raised in the paper—why do men drink to excess at all? It appears that there are numerous theories—psychiatric, genetic, and metabolic. While scientists can increasingly provide support for the moderate intake of alcohol, they also have an important part to play in dealing with the social problem of excessive intake. Drugs to treat chronic alcoholism have been improved in recent years—'Antabuse' (or tetraethylthiuram disulphide) was mentioned by Dr. Cook. As Dr. Rossiter Lewis, a divisional police surgeon, stressed, the intoxicated driver must be eliminated from the road, and alcohol tests that are reliably accurate are a responsibilty of scientific invention. If the law imposes increasingly severe penalties on those who drive cars when 'under the influence', it becomes even more important that the tests used are fair to the individual. A third task of science was mentioned by Mr. A. L. Bacharach—since so much alcohol is consumed in Western nations, it is high time that research was devoted to establishing its food value for ordinary people, apart altogether from its more abnormal effects upon the immoderate minority.

Chemical Industry and the BIF

ADVISABILITY of chemical firms exhibiting each year at the British Industries Fair and whether the advantages of participation are worth the expense and trouble involved have long been queried in this journal (THE CHEMICAL AGE, **62**, 669 and 701). The decreasing number of manufacturers represented and the difficulty of making a presentable display of chemical materials (of some 6,000 chemicals listed in the ABCM directory about 95 per cent are whitish powders or colourless liquids) remains a persistent problem. Chemical manufacturers at large trade exhibitions have indeed shown considerable ingenuity in overcoming this difficulty by showing diagrams, working models, photographs and, where possible, finished products. The whole important problem of 'dressing the window of the chemical industry has again been brought into prominence by a letter circulated by the Association of British Chemical Manufacturers to exhibitors and potential exhibitors seeking their views on a proposal to exhibit less frequently than every year. The BIF has indeed become increasingly the show place of large chemical undertakings or groups of smaller firms sharing a display. While the effectiveness of the Fair is something less tangible than the value of resultant orders, one asset to be borne in mind is the opportunity it affords, not otherwise possible, of meeting overseas buyers and technologists on our own ground. It seems regrettable, therefore, that a proposition examined by the ABCM in conjunction with the British

Chemical Plant Manufacturers' Association to hold a combined chemical and chemical plant exhibition every two or three years should have been turned down as impracticable. Results of the ABCM questionnaire about the chemical representation at the BIF will be awaited with considerable interest.

Chemical Engineering Report

THE Report of the Committee on chemical engineering research presents an overwhelming case for setting up some central organisation to integrate basic or fundamental research with actual requirements in industry. No such centre exists today. Instead, a much scattered variety of chemical engineering research takes place—some universities specialise in certain fundamental problems, industrial research stations have their own chemical engineering departments (as, of course, do many individual companies), and the larger government research centres also embark departmentally into this field. There is, in fact, a good deal of research that can be labelled 'chemical engineering' but it has not been co-ordinated. Plenty of valuable information exists in published form but chemical engineers do not find it easily available. Evidence given to the Committee has left little doubt that this is a problem faced generally by companies and chemical engineers designing new plant. Yet Britain has been predominantly an industrial country for more than a century. The soil chemist, or any other kind of agricultural scientist, has no similar difficulty—a vast mass of information from all over the world has been diligently abstracted and indexed for many years. Is it fair comment to suggest that agriculture has been more generous in recognising and supporting soil science than industry in recognising chemical engineers?

An interesting picture of the fluid catalytic cracking plant at the new Esso refinery at Fawley. The reaction chamber in the centre is 56 feet in diameter. On the right is the reservoir containing the catalyst. The cracker is 200 feet high and is supported by a 12-foot deep concrete base.

copyright: P. Heath

Moving-Burden Coal Gasification

I.C.I. Give First Results of Semi-Technical Plant

GASIFICATION by the moving-burden technique was the title of a paper presented to the Institute of Fuel on the 18 December by J. W. R. Rayner, of I.C.I., Billingham Division. The following is an extract of that paper:—

The conventional method of making water gas involves individual plants for the separate carbonisation of coal to coke, and the subsequent gasification of coke with steam. The process demands lump coke, preferably made from the best-quality coking coals, but in Britain these coals are generally the most expensive and are readily available only in certain localities.

In Germany processes have been developed and operated commercially for the production of water gas from very low-rank coals such as brown coal and lignites, but much less effort has been spent on processes using coals of intermediate rank, which are widely available in this country. The brown-coal processes use coal either in the form of dust or as briquettes. The most successful of the dust gasification methods is the Winkler process, which made a substantial contribution to German oil production during World War II. This uses coal in the size range 0-8 mm., and the fuel bed is blown with a mixture of oxygen and steam at a rate high enough to give it a characteristic boiling motion or, in present-day phraseology, at a rate more than sufficient to fluidise it.

Air Cannot be Used

Air cannot be used to provide the heat required for gasification, for various reasons. In the first place, to make the process continuous, by mixing air and steam, would involve the production of a weak gas containing much nitrogen. If a separate blow were used a large amount of potential heat would be lost, because the blow gas in such a process would contain a high percentage of carbon monoxide. Oxygen is therefore necessary, and in spite of the big developments that have been made in recent years oxygen remains relatively expensive for use in gasification.

In the Winkler generator, formation of clinker caused by local overheating does not occur, because of the mobility and high rate of heat transfer of a fluidised bed.

The success of the fluidised-solids process for catalytically cracking petroleum suggested a new technique which might be applied to gasification methods. By making use of the facility with which fluidised solids can be transferred from one vessel to another, the two reactions involved in the gasification of coke, namely the exothermic oxidation reaction between air and coke, and the endothermic reaction between steam and coke, could be carried out in separate vessels. The heat produced in the exothermic reaction could be carried to the steaming vessel by the circulating burden, and it would be possible to design each vessel for the conditions required by each reaction. Furthermore, air rather than oxygen could be used for the exothermic reaction without contaminating the water gas with the products of combustion.

Patent Applied For

In view of its considerable interest in hydrogen production and the doubt about future availability of good coking coals, Imperial Chemical Industries, Ltd., decided to investigate the possibilities of a moving-burden process. The first exploratory experiments led to a patent application in 1944, and by 1947 work was sufficiently advanced for a decision to be taken to build a large-scale semi-technical plant incorporating a number of features which are the subject of further patent applications. This semi-technical plant was completed in 1949 and has been in continuous operation since that date.

Conversion of coal into water gas consists essentially of three processes: (*a*) carbonisation, (*b*) reaction between steam and coke, (*c*) combustion of part of the coke or of the gas made, to provide heat for these reactions and to make good the sensible-heat and radiation losses.

The scheme that I.C.I. first had in mind was to perform these reactions in three interconnecting vessels. Hot solid material from the combustion vessel would circulate through the carbonisation and steaming vessels to provide the heat requirements of the reactions occurring in them. Such a

scheme would produce carbonisation gases in one stream and water gas in another. No gas would be required for heating, and the scheme would be analogous to the process in which coke ovens are fired with producer gas made from part of the coke.

As the Billingham experiments proceeded it became evident that there are considerable advantages in a two-vessel process, in which combustion is carried out in one vessel and steaming and carbonisation are conducted together in the second. The work on coal described in this paper has used this method of operation.

Several Advantages

These methods have several advantages over some other suggested processes for gasifying non-coking coals. Thus an expensive oxygen plant is not required. The high heat-transfer coefficient of a fluidised bed offers a method of avoiding the old problem of carbonisation—how to get heat through a poorly conducting layer of coke to the coal beyond. The heat normally lost in quenching coke is available to the process. The fact that it is possible to design and operate each vessel for a specific reaction, offers opportunities for economies impossible in, for example, the make-and-blow process. The conditions required for combustion are quite different from those required for the reaction between steam and carbon.

There are, however, certain disadvantages. Firstly, the uniform temperature of such a homogeneous system implies that the gases leave the vessel at substantially the bed temperature. In a static bed, however, the incoming cold material enters in countercurrent flow to the gas and acts as a heat exchanger. With a fluidised system this internal heat exchange is absent and special steps have to be taken to recover heat. Secondly, it is known that with fluidised processes, special precautions are needed to prevent excess dust loss. The extent of this in the treatment of bituminous coal was one of the factors to be determined.

In early 1944 there was no published information on the design and operation of a fluid-solids process, and so laboratory and small-scale work was undertaken to investigate the physical and chemical engineering problems involved. As a result various important devices were evolved for handling fluidised solids, and experience gained made it possible to design and build a semi-technical scale plant.

This was designed with three vessels and arranged for working as either a two-vessel or a three-vessel system. The central vessel was a brick-lined vertical tube 1 ft. in diameter and 32 ft. long, designed for the combustion reaction. A vessel on one side, the carbonisation vessel, was 2 ft. 6 in. in diameter and contained a bed of finely divided coke, 8 ft. deep. A vessel on the other, known as the steaming vessel, was 3 ft. 6 in. in diameter and the bed was 12 ft. deep. Both vessels were provided with 8 ft. of disentanglement space above the fluidised bed, and a cyclone. The tail pipe of the cyclone dipped below the surface of the fluid bed to return the recovered dust to the bed while it was still hot.

In the operation of this plant, air, preheated to 500°C., is blown into the base of the combustion tube and meets a stream of hot coke coming from the base of either or both vessels. Combustion takes place rapidly and the heat liberated is absorbed by the excess of coke and ash present, the temperature rise being kept small by circulating a large excess of burden. Normally only 1-2 per cent of the carbon present is consumed per pass through the combustion tube, and temperature rise is only 20-50°C. The temperature of the heated solids is well below the melting point of the ash, and the combustion tube remains clean and free from deposits.

Permits Separation

Combustion takes place with the solids in the entrained state and the combustion products carry the hot solids into the hot-coke bunker at the top of the combustion tube. The fall in entrainment velocity in the bunker allows much of the entrained solid to separate and the remainder is separated from blow gas in an external cyclone, from which the recovered solids are returned while still hot to the bunker. The hot solids then flow by gravity into either of the two vessels through brick-lined pipes. Solid fuel can be injected into the fluidised beds of either vessel and both are fluidised with steam or any other appropriate gas.

When coal is injected it is carbonised rapidly and the hot coke produced becomes part of the burden flowing out of the base of the vessel into the combustion tube. Carbonisation absorbs heat mainly in heating

up the coal and in providing the latent heat of the distillation products, so the temperature of the out-flowing burden drops an amount which depends on the amount of coal fed and the amount of hot burden fed to the combustion tube. The coke-steam reaction is endothermic and so the fall in temperature depends on the amount of water gas made.

The important factors that have been investigated in this plant are those relating to output (which mainly affect capital cost) and those relating to efficiency (which affect operating costs). The important output factors are: (a) the maximum temperature at which the plant can be run; (b) the bed depth; (c) the reactivity of the coke used; (d) the carbon content of the burden; (e) steam decomposition.

(a) According to previously published work, the temperature coefficient of the reaction between steam and coke is such that the amount of gas produced is approximately doubled for a rise in temperature of 50°C. in the temperature range up to 1,000°C. It is therefore desirable to operate at the highest temperatures that the properties of the ash will permit. With the cokes so far used, all of which have ash melting-points of about 1,350°C., the maximum temperature in the combustion tube at which the plant can be operated continuously is limited to 1,030°C. This temperature is quite critical with the cokes which have been used in the present investigation. At the hottest point in the system (the top of the combustion tube) a temperature of 1,040°C. was sufficient to prevent the burden from flowing through the governor tube into the steaming vessel because of the formation of a very light sinter. At this temperature the particles of ash appear to become slightly sticky and the burden loses its free-flowing properties. No experiments have been made with cokes of low ash melting-point, so that it has not been possible to determine how the sintering temperature varies from the one type of coke ash to another.

Temperature Differences

The steaming vessel inevitably operates at a temperature less than the maximum which occurs in the combustion tube, because the reaction between steam and coke is endothermic. The difference between these temperatures is inversely proportional to the burden circulation rate and can be made small with a very high rate of circulation. By circulating a large amount of hot burden through the steaming vessel it is possible to make the amounts of heat absorbed by reaction of steam and coke very small compared with the amount of heat available. There is then no restriction in the heat available to the process, and the difference in temperature between the maximum in the combustion tube and that in the steaming vessel is small. In the present investigation this temperature-difference has been reduced to about 20°C., and thus the maximum temperature in the steaming vessel has been fixed at 1,010°C. Most of the experiments were, however, made at a slightly lower temperature (990° to 1,000°C.). Accurate control of temperature presents no difficulty. The plant is quite stable and it is possible to run continuously at 1,000°C. with no greater variation than ±5°C.

Output Rises with Depth

(b) The output of H_2 and CO rises as the depth of the bed in the steaming vessel is increased. Increasing the bed depth from 8 ft. to 12 ft. gives an increase in output of 50 per cent.

(c) The output of H_2 and CO is dependent also on the reactivity of the coke used. In a 12 ft. bed, using oven coke from water-gas-generator cyclones, the output of H_2 and CO was 110 m.³/hr. Coke prepared from coke-oven screenings produced an output of 160 m.³/hr. This coke had been made in old ovens working at a relatively low flue temperature, and for that reason may have been more reactive. Fresh coke gives a greater output than partly spent coke. If, for instance, the coke feed rate is doubled, and the ash purge increased to accommodate the excess coke fed, the output is increased by 28 per cent. If, however, the plant is fed with partly spent coke (50 per cent ash) the output falls by 23 per cent from its normal level. These results are in agreement with the well-known fact that the reactivity of coke is not constant, the first portion consumed being more reactive than the remainder.

The factors determining efficiency are: (a) The amount of combustibles in the blow gas; (b) the material efficiency.

In the combustion of carbon much less heat is liberated in the formation of CO than in the formation of CO_2, so as little as possible CO must be produced in the combustion tube.

In a fixed bed of coke the CO content of

the blow gas increases as the particle size of the coke is decreased, and it might be expected that with the very fine particles used in this process the CO content might be very high. In this investigation, however, it was found that burning the coke particles in an entrained stream kept the CO in the blow gas at a low concentration. High entrainment velocities can easily be achieved in the combustion tube.

Causes of Loss

Loss of carbon as such can occur in two ways: (a) with the purge, and (b) with the dust that is not recovered by the simple cyclones that are fitted in the blow gas and water gas outlets. To reduce dust carry-over in the plant an additional cyclone was fitted to the blow gas outlet, and the dust returned to the plant. The effect of this was to reduce the dust in the blow gas from 55 to 13 kg./hr., but to increase the dust leaving the water gas outlet from 5 to 37 kg./hr., the total dust being reduced by only 10 kg./hr. This carry-over rate represented 20-25 per cent of the coke fed. The coke used had an ash content of about 20 per cent, and the ash content of the dust was similar, which means that the dust did not differ appreciably from the feed.

This production of fine dust represents a loss of material to the gasification stage, as it cannot easily be utilised within the process. It is, however, produced hot and in a form which can readily be burnt, and the heat thus produced could be used for steam raising. Dust lost with the water gas cannot of course be consumed in this way, but by fitting more efficient cyclones in the water-gas stream than in the blow-gas stream, it is possible to direct most of the dust into the blow gas, where it can be burnt.

On the basis of experience gained by the experiments with coke, some preliminary economic assessments of a moving-burden gasification process were made. These indicated that the capital cost of a three-vessel fluidised plant was likely to be considerably greater than that of the conventional coke-oven and water-gas generator system, and a simplification of the process was highly desirable. Experiments on a large laboratory scale with coal had given indications that when the coal-carbonisation vessel was kept fluidised with steam instead of recycle coke-oven gas, the resulting gas product was nearer to the composition of water gas than would be expected from a straight dilution of carbonisation gases with water gas. As the capital cost of a coal-gasification plant would be considerably reduced if a three-vessel system were replaced by a two-vessel system, eliminating coke-oven gas recycle plant and by-product recovery equipment, it was decided at the outset of the semi-technical-scale coal-gasification experiments to try a two-vessel method. The results have been so encouraging that no appreciable amount of work has been done on the original idea of a three-vessel system. Carbonisation and steaming have been carried out together in the steaming vessel (3ft. 6in. in diameter). Coal has been injected directly into the fluidised bed through one, two or three injection points at rates sufficient to maintain the level of the bed. The injection points are equally spaced on a circle 5 ft. from the bottom of a 12 ft. bed. A stream of CO_2 has been used to inject the coal into the bed, although steam could, of course, be used on a larger-scale plant.

Many minor difficulties were encountered when the unit was first started up, but none was of a fundamental character. The plant now runs smoothly and is quite stable. Temperatures can be maintained continuously at 1,000°C. within ± 5°C.

Erosion Entirely Absent

Contrary to expectations, the vessels remain free from deposits and erosion is entirely absent. Starting up and shutting down present no special difficulties provided the established routine is followed. The experimental plant has been run continuously for periods of one to two months, and these runs have usually been terminated voluntarily.

The data obtained by the Billingham experiments and presented in this paper indicate that one of the most likely lines for future development for a fluidised coal gasification process is a two-vessel system, in which the vessels are fitted with cyclones of such relative efficiency that the majority of the fine coke inevitably formed in the process is directed into the blow-gas stream and burnt in suitable apparatus by addition of further air. The suggested process is thus essentially one for the production of water gas, with a considerable amount of steam as a by-product.

The performance data obtained have been

on a small-scale plant which has relatively large heat losses. Coal and coke consumption are therefore higher on this unit than they would be on a large plant. For the production of 1,000 m.³ of water gas in the plant, 0.88 tonne of coal with a gross calorific value of 6,300 kg.cal./kg. was required. 0.42 tonne of low-pressure (15 lb./sq. in.) steam was consumed and 2.6 tonnes of high-pressure (300 lb./sq. in.) steam were produced which became available for generating power. These figures assume that there is heat exchange between blow gas and air and between water gas and steam to the maximum extent that can be achieved in mild-steel heat exchangers.

Capital and running-cost estimates have been made for this type of scheme and show that as long as there is a requirement for the steam by-product the process should be competitive with the conventional two-stage process of coke ovens and water-gas generators, even with to-day's ratio of coking-coal and non-coking coal prices. Any increase in this ratio would increase the attractiveness of the fluidised gasification method.

This account of the I.C.I. research on moving-burden coal gasification should be regarded as an interim report, made because of the great general interest in the subject. Considerable further work, preferably on a still larger scale, is necessary before the process is ready for commercial application.

Canadian Sulphur Needs

1952 Allocation Discussed

REPRESENTATIVES of the Canadian Defence Production's Chemical and Explosives, and Pulp and Paper divisions recently met officials of America's National Production Authority to discuss sulphur supplies to Canada in 1952. Careful study was given to the level of U.S. sulphur exports to Canada in the first six months of the year and to the requirements of Canada's defence industries and pulp and paper mills. Much of Canada's defence effort is closely related to the defence programme of the U.S., and a major part of U.S. newsprint and chemical pulps come from Canada.

The most critical period will be these first six months, it was stated. During the second half of the year some auxiliary sulphur supplies, from pyrites roasters, sour gas wells, and smelter gases will begin to appear and will expand during 1953. To meet the situation until these auxiliary supplies begin to arrive, both countries will be able to make some contributions.

U.S. officials in charge of sulphur allocations have agreed to supply sulphur to Canada on a similar basis to U.S. industry in the first quarter of 1952. In addition they have been able to make certain changes in the traditional pattern of sulphur shipments to provide for rail deliveries to Canadian mills in the winter and early spring months. It is expected that the same treatment will be given Canada in the second quarter of 1952, but this will be subject to review on about February 15. The U.S. officials were hopeful of somewhat larger supplies becoming available for Canada during the last half of the year and expressed their willingness to consider special cases of distress that might develop.

Conservation Efforts Helpful

Canadian sulphur statistics disclosed that the efforts made by Canadian industries, including pulp and newsprint manufacturers, to effect conservation in sulphur usage had been helpful. This conservation has resulted in a lower usage than expected in 1951, and consequently a slightly better average inventory at the end of the year. However, with the most ardent conservation by Canadian mills, sulphur supplies in the first half of 1952 would be insufficient to meet the needs of capacity production of newsprint and pulp in Canada. A further equalisation of mill inventories and a further drain on these inventories will be inescapable, if capacity production is to be maintained. The Canadian officials felt that such further reduction of sulphur inventories would be justified and that no reduction by government order of the rate of Canadian production of newsprint and pulp should be undertaken at least for the first quarter. It is possible that some production losses, through delays in receiving sulphur shipments, will occur in some mills but it is hoped that, through the collaboration of U.S. and Canadian authorities, these production losses will be kept to a minimum. The agencies of both countries will continue to confer from time to time on the problems of sulphur supply, it was announced.

Control of Glasshouse Pests

Crop Protection Panel Hears W. H. Read

A REGULAR meeting of the Crop Protection Panel of the Society of Chemical Industry was held in the Rooms of the Chemical Society, London, W.1, on 4 December. The chair was taken by Mr. N. K. Smith, and Mr. W. H. Read, M.Sc., A.R.I.C. (Head of the Insecticide and Fungicide Department, Experimental and Research Station, Cheshunt) read a paper entitled 'Chemical Control of Glasshouse Pests and Diseases'.

Mr. Read said that there were nearly 4,600 acres of glass in England, mainly concentrated in the Lea Valley and in Lancashire.

Special problems arose in connection with the control of pests and diseases of glasshouse crops due to the marketing of food and flowers at the time when attacks by pests and foliage diseases were usually most severe.

Mr. Read then reviewed the developments in methods of application and materials, particularly insecticides, which had taken place in the U.K. and other countries. The conventional spraying and dusting treatments were being replaced by 'aerosols' and 'smokes' since these gave deposits underneath as well as on top of leaves.

Value of New Insecticides

Recently introduced insecticides of the chlorinated hydrocarbon and organo-phosphorus types were proving of great value for the commercial control of glasshouse pests, and had replaced most substances used eight years ago. Mixtures of azobenzene and parathion were used widely for the control of glasshouse red spider. The problems of increased tolerance to insecticides by insect populations, and the results of investigations with other acaricides, including the use of the systemics, were mentioned.

Copper-petroleum emulsion sprays had not been replaced by any of the newer fungicides. The use of the thiocarbamates for some minor diseases was mentioned, and a brief résumé of recent glasshouse trials of fungicides given.

Possible developments in the partial sterilisation of soil with volatile chemicals were referred to.

The lecture was illustrated with slides.

During the discussion which followed Mr. J. C. Hall asked whether the fungicides mentioned for the control of mildew on cucumbers penetrated the leaf. Mr. G. B. Reilf asked whether antibiotics had been tried as fungicides.

Mr. J. H. Stapley said that crude benzene hexachloride was more injurious to plants than the pure gamma isomer. Smokes were based on gamma BHC and were safe on tomatoes. He asked why there should be red spider resistance to azobenzene on cucumbers and not on tomatoes, and whether resistance to parathion when it was mixed with azobenzene was likely to occur.

Ethyl Mercury Phosphate

Mr. F. L. Sharp stressed the highly toxic and vesicant properties of ethyl mercury phosphate which was very volatile and asked what precautions were taken by the workers when using it to treat soil infected with *Didymella Lycopersici*.

In replying to the discussion, Mr. Read said that, as normally formulated, the fungicides did not penetrate leaves. The phytotoxicity of oil emulsions of fungicides was probably due to penetration.

Antibiotics had been used but were very phytocidal even at low concentrations.

The rate of breeding of red spider on cucumbers was greater than on tomatoes. This was probably the reason why resistance of red spider to azobenzene on cucumbers had developed. Red spider resistance to parathion when mixed with azobenzene was a possibility which should not be overlooked.

With regard to the hazards of using organo-mercurials for soil treatment, Mr. Read said that workers were provided with full protective clothing. The houses were well ventilated and the treating solution which contained only 0.06 per cent mercurial, was applied before tomatoes were planted. The smell of the mercurial soon disappeared, and this was regarded as terminating the danger period. The mercurials were more persistent in soils which had been recently mulched and their use was not then recommended.

Constitutional Study of the Sapogenins

Investigations at the Forest Products Research Laboratory

CHEMICAL investigations play a prominent part in the programme of the Forest Products Research Laboratory, Princes Risborough, Aylesbury, Bucks, judging by 'Forest Products Research, 1949' published recently by the Department of Scientific and Industrial Research (HMSO. 2s. 6d.; U.S.A. 65 cents).

Conversion of the first two huts as part of a permanent chemical laboratory had been completed by the end of the year, the report states. Chemical analysis of the selected tropical timbers was continued and some interesting substances had been obtained. The pilot plant for the investigations on the possibility of utilising tropical timbers for hardboard manufacture was almost completed and the testing of individual machines was in hand.

A constitutional study of the sapogenins derived from mora saponin first described in the 1948 report had been undertaken by Dr. D. H. R. Barton, of the Imperial College of Science and Technology, who had found that the principal component of the mixture was a pentacyclic triterpenoid hydroxy-carboxylic acid, hitherto not described, and for which the name 'morolic acid' was proposed.

Saponin Content

In a study of the distribution of saponin in the heartwood of mora it had been found that, in any single tree, the saponin content tended to be rather greater in the upper than in the lower portion of the stem. There was considerable variation in total saponin content between tree and tree, the minimum content encountered being 2.8 per cent and the maximum 9.6 per cent of the dry weight of wood.

Systematic fractional crystallisation of the mixture of mora sapogenins yielded four main products. One of these was morolic acid, one was probably oleanolic acid, and the other two were mixtures. It had been found experimentally that morolic acid, $C_{30}H_{48}O_3$, m.p. 269-270°C., crystallised with one molecule of alcohol and that the latter was removed on heating at 160° *in vacuo*. The equivalent weight of morolic acid and the acetyl content of its acetate were in agreement with the view that it was a monohydroxycarboxylic acid.

The saponin of morabukea heartwood was isolated in 4.1 per cent yield in a dry wood basis. Only one well defined sapogenin was obtained from this saponin. Found for the sapogenin m. pt. 298-300°, $\left[\alpha\right]_D^{20°}$ + 74.0° (c = 2.02 in chloroform) and, for the acetate of the sapogenin, m. pt. 266-267°, $\left[\alpha\right]_D^{20°}$ + 73.5° (c = 2.19 in chloroform). This sapogenin was very similar in its properties to oleanolic acid, but its identity had not been definitely established.

Two Principal Sugars

Although the principal sugars obtained on hydrolysis of both of the above-mentioned saponins were glucose and xylose, partition chromatography had revealed that mora saponin yielded minor amounts of two other sugars, namely a hexose and a pentose. The unknown hexose and pentose were also found in the hydrolysate of morabukea saponin in admixture with very small amounts of two other unidentified sugars. It was possible that those sugars found to occur in traces in the saponin hydrolysates might have been derived from impurities such as wood hemicelluloses rather than from the saponins themselves.

Investigation of the granular starches isolated from the sapwood of English oak, Turkey oak, maple and elm had been continued in conjunction with Professor E. L. Hirst and his collaborators in the Chemistry Department of the University of Edinburgh. From an analytical point of view, tannin had proved to be the most troublesome impurity in all of these preparations, since it interfered with the reactions used in the characterisation of starches.

Tannin, for example, was found to oxidise potassium iodide with the liberation of free iodine so that, in order to determine the amylose content of wood starch by potentiometric iodine titration, the free iodine

liberated by the tannin impurity had first to be removed with dilute thiosulphate. Lignin and anthocyanin were found to be minor impurities in wood starch preparations which also interfered in reactions typical of pure starches.

In the periodate oxidation used to determine the chain length of the 'laminae' of the amylopectin components of wood starches, low results were obtained, owing to the production of excess acidity by these impurities and by tannin in particular.

White Crystalline Substance

In examining a recent case of dermatitis attributed to dust from Peroba de campos wood (*Paratecoma peroba*), a commercial firm observed a white crystalline substance on exposed surfaces of several pieces of wood after machining, and samples were submitted to the laboratory for investigation.

Careful scrutiny of these, as well as of samples of Peroba de campos from other sources in this country, revealed that this crystalline substance was present in all of them. It is readily isolated from the wood by steam distillation and purified first by washing with dilute aqueous sodium carbonate to remove lapachol (a yellow colouring matter of common occurrence in woods of the *Bigoniaceae* to which family Peroba de campos belongs), then by repeated recrystallisation from alcohol, washing with water, drying over phosphorous pentoxide and finally by sublimation *in vacuo*.

The pure substance which was obtained in yields of the order of 0.7 per cent of the dry weight of the original wood consisted of colourless, odourless plates melting at 62°C. It formed a well defined, crystalline picrate of melting point 150°C., and responded positively to tests for unsaturation.

In solution in organic solvents the substance was photosensitive and gave a yellow-coloured end-product. Treatment with hydrobromic acid or preferably with dry hydrogen chloride in chloroform solution brought about almost quantitative isomerisation, presumably by ring closure. The isomer is a colourless crystalline substance of melting point 258°C.

Composition of the original substance was C 79.68 per cent; H 6.63 per cent; O 13.69 per cent, by difference (average of 14 analyses). The most probable molecular formula was therefore taken to be $C_{16}H_{16}O_5$ which required C 79.97 per cent; H 6.69 per cent.

While this investigation was in progress in co-operation with Dr. D. H. R. Barton, of the Imperial College of Science and Tèchnology, and before its identity was established, it became known that the chemistry of the minor components of Peroba de campos wood was under investigation by Professor E. R. H. Jones in the Chemistry Department of the University of Manchester. Professor Jones had already recognised a crystalline component as lapachonone, and this proved to be identical with the substance isolated at the Forest Products Research Laboratory.

Chemical inquiries were varied and some involved a considerable amount of experimental and analytical work. In view of the shortage of well-known woods imported from dollar areas, the year was marked by an increase in the number of requests for information about possible woods from sterling areas for the construction of vats and of various other items of plant and accessories used in the chemical industry. Over 40 inquiries were concerned with the diagnosis and treatment of defects such as stains, odours and gum exudations.

Many inquirers sought information on the use of wood fibre and of waste wood for the manufacture of various forms of fibreboard and, in several instances, advice was sought on the cause and prevention of metallic corrosion in wood/metal assemblies.

Fungi as Secondary Agents

An interesting discovery, that fungi may play a part as secondary agents in increasing the rate of deterioration of timber slats in water-cooling towers of power stations and other industrial plants, was made in the mycology department.

Isolations made from timbers yielded a variety of fungi of the *Ascomycetes* and *Fungi Imperfecti* groups, together with much bacterial contamination. The species of fungi isolated had not all been identified. However, among the *Ascomycetes, Chaetomium globosum* and *Orbicula spadicea* had been positively recognised.

Chaetomium was known as an active cellulose destroyer. The layers of summerwood walls attacked were those thought to contain nearly pure cellulose, and the regions believed to be more heavily protected by lignification were not affected. On the other

hand, *Orbicula*, while often recorded as growing on cellulostic materials, was reputed to be best sought for near the charred areas of partially burnt wood, that is, on wood already partly hydrolysed by heat.

Testing of wood preservation was an important part of the laboratory's work.

There was no certainty that coal tar creosote, which was still the most widely used preservative for the treatment of external timbers, would always be available in sufficient quantity to meet the demands for this purpose. It was at present a surplus by-product of the coal-gas and coke industries. If alternative uses such as for fuel or as a raw material for other chemical products were developed, it was possible that the cost and availability of creosote would be such as seriously to affect its use in wood preservation.

It was therefore desirable to anticipate such a possibility and to obtain information on the efficiency of alternative oil-type preservatives for pressure application. The only practicable alternatives were toxic materials dissolved in a cheap non-toxic oil such as fuel oil. A start had been made to evaluate these by putting under test solutions of pentachlorophenol and copper naphthenate in petroleum fuel oil, and impregnated specimens were now under test in the ground at two test sites.

Fire hazard of wood depended mainly on its inflammability, but it was also influenced by the ignition temperature of the charcoal formed when wood was heated. As there was very little information available on this property, a series of ignition temperature measurements on a number of different species of wood had been carried out. It had been found that this property varied a great deal from one kind of wood to another, but so far the factors responsible for this variation had not been identified.

Ignition Temperature Variation

Ignition temperature of any one species, however, was not constant, but had been found to vary with the temperature at which the charcoal was formed. This variation with carbonising temperature was regular and much greater than the variation between different species. In addition it had been found that ignition temperature also varied regularly with the period of carbonisation.

The method used for these determinations consisted of exposing specimens to a series of constant known temperatures and observing the minimum temperature at which ignition occurred. This procedure was tedious and probably for this reason was very rarely used, but it was believed to give truer results which were in closer accord with the behaviour of wood in actual practice.

In connection with an investigation recently carried out into the inflammability of wood, the permeability to air of about a hundred different species of wood had been measured. Very little is known of this particular property and since it was of value in other fields, particularly in wood preservation, the work was being continued.

Advisory work continued to be an important feature of the laboratory and nearly 13,000 inquiries were now received annually. The overall total was in fact showing a substantial yearly increase. This was producing a dilemma, for although the flow of inquiries was an indication of the increasing confidence of the trade, the volume of work entailed by them must not be allowed to swamp the fundamental studies.

Coloured Micrographs

THE production of electron micrographs in colour has recently been achieved in America. The colours are not produced by the electron beam, as colour is a property of visible light, and hence the colours obtained are not the same as those of the object being examined. However, the greater contrast of the colour prints makes them helpful.

The pictures are produced by developing exposed colloidal silver chloride in the emulsion. The process begins with a contact print on an ordinary lantern slide plate. These plates are resensitised by treatment with silver nitrate solution, followed by immersion in ammonium chloride solution, to introduce the silver chloride into the emulsion. The plates are then re-exposed to light and developed in a glycine developer. The resulting negative is transparent and has a complete range of colours from black to dark blue where the original negative was most dense, through light blue, green-blue, green, yellow-green, yellow and orange, to red where the negative was thinnest. The fixed plates should be covered with cover glasses to keep out the air and preserve the colours. Full colour prints can be obtained from these negatives by dye transfer processes.

Participation in the BIF

Chemical Firm's Views Sought by ABCM

CHEMICAL industry's share in the British Industries Fair has for some years been the subject of considerable controversy. The following letter, enclosing a questionnaire, was circulated on 17 December by the Association of British Chemical Manufacturers to all exhibitors in the chemical section in 1950, 1951 and 1952:—

In recent years there has been a growing body of exhibitors in the chemical section at the British Industries Fair, who have felt that annual participation in this event involved a strain on their resources which was not justified by the results achieved. It was with the object of exploring methods of overcoming this difficulty that the Association invited interested members to express their views in 1949. The possibility of holding a combined chemical and chemical plant exhibition every two or three years was also closely examined in conjunction with the British Chemical Plant Manufacturers' Association, but it was decided to be impracticable, mainly because of the cost of adequate publicity overseas.

Another Opinion Sought

In view of the renewed interest expressed at a meeting held on 16 October, 1951, in the proposal to exhibit less frequently than every year, another expression of opinion by exhibitors and potential exhibitors is now sought. The various alternatives are briefly as follows:—

1. Participation in alternate years by the chemical industry might be achieved by exhibiting in those years when the plastics section was not holding its own exhibition This would in effect, involve alternating with the plastics section. As there is a nucleus of chemical firms which would in any event continue to exhibit every year, it is doubtful whether this arrangement would be wholly acceptable to the British Plastics Federation, which would prefer the whole of the space. There might also be pressure from the Board of Trade to move the chemical section to Earls Court if this scheme was adopted.

2. The chemical section might continue to appear each year, but many of the individual exhibitors might decide to exhibit only in alternate years on a 'rota' basis. If this were arranged on an industry basis, rather than haphazardly, it should result in a fairly stable size and position for the section which would also be reasonably representative each year. This arrangement would be welcomed by the Board of Trade. It would meet the wishes of those members who feel strongly that in present world conditions the importance of maintaining the strength of the BIF as an annual display by British industry outweighs any other considerations, and which therefore, would continue to exhibit every year. It also would meet the needs of those who wish to alternate.

3. Finally, it might be left, as at present, to individual members to decide freely on each occasion whether to exhibit or not without reference to any previous decision on this point.

It has been suggested that those members who decide not to exhibit in any particular year might wish to take standardised display show-cases on an enlarged association stand, on the lines of those provided for its members by the British Plastics Federation in recent years. Such a scheme would provide members with a relatively inexpensive means of participating in the Fair, and of placing a small selection of their goods on display. The cost to each member would naturally depend on the total number of show-cases required and on the overall design, but should not greatly exceed £50. It is felt also that some members who do not regularly participate in the BIF might wish to take part in such a scheme.

Cancer Growth Inhibited

FOLLOWING the investigations into the effects of podophyllotoxin on cancer, further investigations have been undertaken in the Cancer Research Department of the Royal City of Dublin Hospital into other chemicals having the lactone group (>CH—O—CO—), two of which, coumarin and γ-butyrolactone have been found to inhibit growth. The investigations are being conducted under the supervision of Dr. Desmond J. Riordan, F.R.C.S.I., with a view to proving that these lactones have an action on cancer similar to colchicine. It is not claimed yet that they will ever be a cure for cancer, but Dr. Riodan thinks that further investigations might lead to interesting results.

Indian Newsletter

(From Our Own Correspondent)

THE Government of India, have announced that under the Atomic Energy Act of 1948, they will purchase all stocks of acceptable uranium-bearing minerals at a minimum of Rs. 9s. per lb. of contained uranium oxide, for a period of five years. The price will include all radioactive elements in the ores or concentrates but consideration is to be given to the other commercially recoverable elements such as the cerium group, niobium and tantalum. In the case of Samarskite, in addition to the price for uranium, an extra amount of Rs. 1/8/- for every lb. of the mineral will be paid for its niobium and tantalum content. Samarskite, a massive, lustrous, velvety black and heavy primary mineral, containing varying percentages of uranium, was discovered in 1908 in the mica mines of Nellore (Madras) and in Yedur (Mysore). It has not been worked in India thoroughly till now. Recently studies have been initiated on the geology and chemistry of this mineral. It is expected that advantage will be taken of the impetus given by the Government for the proper exploration and exploitation of Samarskite in India.

* * *

Mr. Hillburn, a Point Four Expert, who was invited by the Government of India to survey the resources of sulphur in India, especially the recovery of the element from the processing of copper, has returned to the United States after his study in the subcontinent. He is shortly scheduled to submit his report on the availability of sulphur in India. It may be mentioned that the sulphur committee of the International Materials Conference have recommended an allocation of 11,000 long tons to India for the last quarter on the basis of the present world supply.

* * *

The Mica Advisory Committee which met at Jaipur on 1 December, under the Union Minister for Natural Resources, is said to have recommended a ban on the export of scrap mica for a period of one year. It is believed that the recent fall in prices in the United States market for mica may not have any serious repercussions on the Indian mica industry. There is no overproduction in India and the price structure, the committee felt, was only seasonal and did not call for any control.

Scrap or waste mica accounts for about 30 per cent of the total export of mica. Though the United Kingdom is one of the principal markets for Indian mica, there has been a steady decline in the trade over the last three years. But the latest statistics reveal an apward trend, as evidenced by the following figures:—

Exports to U.K.

	(Each year 1st April to 31st March)			5 months April to August
	1948-49	1949-50	1950-51	1951
Mica Cwt. (112 lb.)	116,771	95,807	86,036	65,333

If present buying interest is maintained, the United Kingdom may probably replace the United States as the chief recipient of Indian mica.

* * *

At the recent meeting of the Council of Scientific and Industrial Research (India) steps were suggested for the recovery of gypsum and bittern salts from salt manufacture and the improvement of the quality of the salt. Indian salt contains 91 to 93 per cent NaCl with impurities of the sulphates of calcium and magnesium and magnesium chloride. An experimental salt farm started in Wadala (Bombay) in 1949 has now a production control laboratory and produces white salt of 95 to 98 per cent NaCl, though with a slight increase in cost. The Government of India have approved the establishment of a research station at Sambhar Lake (Rajasthan) for the recovery of large quantities of gypsum, as also other chemicals from the bitterns.

* * *

One more in a chain of research laboratories all over the world has been built by the Imperial Chemical Industries (India), Ltd., at a cost of one million rupees at Tiljala, a Calcutta suburb. It was declared open recently. The laboratory will aid small industries like plastics and rubber and will offer courses and training facilities to customers' staff in chemicals, dyestuffs and water treatment. The I.C.I. will shortly begin manufacture of 'Gammexane' in India.

Extensive deposits of glass sands have been located in Naini (Uttar Pradesh) and Bundi (Rajasthan). The silica content varies from 91 to 99 per cent. The iron oxide in Naini is about 0.2 per cent while that at Bundi is less than 0.02 per cent, which is within the specification required for optical glass. The sand deposits are to be used for the manufacture of windowglass, plateglass, bottles and glassware.

* * *

The Fine Chemicals Section of the Indian Standards Institution has drafted standard specifications for the quality of potassium metabisulphite, the manufacture of which has recently begun in India. Other chemicals for which standards have been circulated include oxalic and boric acids.

Synthetic Rubber Project

Scottish Production Being Investigated

POSSIBILITY of establishing synthetic rubber production in Scotland is being investigated by the chemical sub-committee of the Scottish Council (Development and Industry).

This is a project of major importance to Great Britain, which so far has not entered the field of synthetic rubber manufacture, and it is now made feasible by the growth of the chemicals-from-oil industry at Grangemouth.

Interest in the industrial applications of synthetic rubber has greatly increased in the U.K. in the last 18 months, particularly in regard to the quantities of butadiene and styrene which are likely to be available from the new petroleum cracking plants or other sources.

A general survey of the sources, production, and consumption of synthetic rubber (GR-S) in the U.S.A., was given in the *Glasgow Herald* recently by a special correspondent, who also examined the prospects of its manufacture in this country and pointed out that the only plant in which large-scale production of styrene was planned appeared to be that of Forth Chemicals at Grangemouth.

British industry, it was estimated, could absorb at least 50,000 tons of synthetic rubber annually, but no very reliable evidence was yet available about the minimum economic size of a synthetic plant. One set of calculations at present being tested, put annual output at about 30,000 tons.

Attention was now being given to the cost of producing butadiene especially for synthetic rubber by treatment of certain fractions from oil 'cracking' processes and from molasses alcohol. It did not seem likely in either case that the price would compare with that of 'adventitious' production—that was production of butadiene as part of an integrated process within the large cracking plants.

It was evident that the latest round of restrictions on capital expenditure might cause further difficulty. The Scottish Council, however, was stated to be keeping in close touch with developments on both sides of the Atlantic, in addition to undertaking a series of specific inquiries on questions of costs.

Organic Chemical Prices

OWING to raw material difficulties, with consequent increases in costs of production, British Industrial Solvents, Ltd., have announced that they have found it necessary to increase, with effect 10 December, the selling prices of certain BISOL organic chemicals. The new prices per ton, carriage paid, in packages returnable at seller's expense, are as follows:—

Acetone.—Increased by £30 for delivery in bulk and in 45-gallon drums; by £35 in 10-gallon cans; and by £40 in 5-gallon cans, to:—

50 tons, spot or contract over calendar year	£112
10 tons, spot or contract over calendar year	£113
1 ton, spot or contract over calendar year	£114
45 gallon drum	£115
10 gallon can	£135
5 gallon can	£145

Isopropyl acetate: Increased by £10 in all categories, to:—

10 tons, spot or contract over six months	£158
1 ton, spot or contract over six months	£159
45 gallon drum	£160
10 gallon can	£180
5 gallon can	£190

Lobosols:

	Lobosol F.S.	Lobosol M.A.	Lobosol S.S.	Lobosol F.S.
Increase in all categories	£19	£12	£5	£3
Minimum 10 tons over calendar year	£142	£107	£105	£120
Minimum 1 ton over calendar year	£143	£108	£106	£121
45 gallon drum	£144	£109	£107	£122
10 gallon can	£164	£129	£127	£142
5 gallon can	£174	£139	£137	£152

German Chemical Production Improved

Synthetic Rubber may be Exported

THERE has been a distinct improvement in German chemical production during the past two months, chiefly due to normal seasonal factors and the increase in coal supplies. The coal output in the Ruhr set up a new record at the end of November, and coal allocations to industry, including the chemical trades, for the first three months of 1952 have been raised above the October-December figure. There is still a deficit on paper but the authorities hope to cover this by extra shifts and imports. The chemical industry hopes for favourable treatment as regards coal supplies because of its importance as an exporter.

The production of synthetic rubber has now been resumed in Western Germany. Butadiene is made at a rate of about 500 tons a month by Chemische Werke Hüls, Most of the production is used for making buna at Hüls, but a small part is being passed to Farbenfabriken Bayer, Leverkusen, where it is used to make perbunan (three parts of butadiene and one part of acrylic acid nitrile) at a rate of about 100 tons a month. Part of the synthetic rubber production is to be exported.

Chemische Werke Hüls have gone more closely into the question of extending the synthetic rubber production. The difficulties are still formidable. To raise production to 1,500-2,000 tons a month, investments to the sum of £1,250,000-£1,750,000 would be required, which is three to four times the amount of money put into restoring the plant so far. Moreover, the acetylene process is considered economically obsolete. Negotiations are in progress with a U.S. company to acquire the German rights for a process startng from butylene. This could be obtained in Germany from cracking Middle East crudes.

Again Co-operating

Chemische Werke Hüls is again co-operating closely with Scholven Chemie AG which only recently resumed the production of liquid ammonia at a rate of 30,000 tons a year. Hüls receives methane and ethylene from Scholven through direct pipeline and in return provides hydrogen for Scholven, also through a direct pipeline. Reconstruction work on the hydrogenation plant is now proceeding at Scholven. By next spring it will probably be possible to open the plant for treating crude oils at a rate of 400,000 tons a year, to be raised later to 700,000 tons. Work is also in progress on a 20-mile pipeline from the inland port of Duisburg to the Scholven plant. The crudes to be treated will be obtained from the Middle East and the native oilfields in Emsland.

Half Output Exported

The Scholven-Huels complex is thus likely to become an important unit for the treatment of crudes for chemical purposes. In addition to butadiene and buna, Hüls is already producing solvents, plasticisers, detergents and intermediates for the production of synthetic fibres. About half the output is being sold abroad.

What is described as the biggest post-war contract between a German and a U.S. firm has been concluded between the Firestone Tire and Rubber Co., of Acron, Ohio, and Harburger Gummiwarenfabrik Phoenix AG at Hamburg-Harburg, the centre of the German rubber industry. The immediate effects of the agreement appear to be small as Phoenix will continue to produce and distribute its own products made according to its own processes. The German firm, however, will be able to draw freely on the experience of the U.S. firm and be supplied with technical information. When U.S. experience has been evaluated and applied, 'Firestone-Phoenix' products will be offered in the German market, superseding 'Phoenix' products. Nothing is known of plans to export Firestone products from Germany, but the agreement is expected to have widespread repercussions in the commercial field.

All the major potash companies propose to enlarge their production next year. Burbach has announced plans for a 50 per cent increase which may involve reopening of the Desdemona mine, destroyed by an explosion in 1947. Wintershall has enlarged and modernised the Bergmannssegen works by combining it with two mines, Hugo and Hohenfels, closed down before the war and will reopen the Hildesia-Mathildenhall mine. Salzdetfurth has resumed operations at the

Sigmundshall works and is credited with the intention of enlarging production in other mines too. Total potash production in Western Germany in 1951 is provisionally put at 1,250,000 metric tons (K_2O), that is 30,000 tons less than the entire output of Germany, eastern and western, in 1939.

West German potash production is thus two and a half times what it was before the war and still rising, but the producers do not anticipate any difficulty in disposing of it. Stocks in producers' hands are said to be very small, and orders received last month were twice the volume of the corresponding month last year. As regards exports, it is hoped greatly to increase shipments to the U.S.A. where German sulphate of potash is in great demand from the cotton and tobacco States because of its magnesia contents.

Further progress is reported by 'Perlon' fibre producers. Kunstseidefabrik Bobingen has put an extension into commission and is now making 'Perlon' at a daily rate of five tons. Woollen and cotton manufacturers are now taking a substantial part of the output for use in woollen and cotton fabrics. A new 'Perlon' plant was opened a few months ago by Spinnstoff-Fabrik Zehlendorf AG in Berlin; erected with the help of a DM. 1,000,000 ECA loan, it supplies one ton of 'Perlon' a day.

Waste Fission Products

Possible Industrial Uses

THE industrial use of the radiation emanating from the waste fission products of atomic energy plants producing plutonium has been investigated by the Stanford Research Institute of America, which reports that a potential large-scale demand for the products exists in industry, but that many technical and economic problems must be solved before their use becomes practicable.

Among the commercially feasible applications in industry that the Institute found were in the activation of phosphorus for self-luminous signs and markers, as static eliminators for a variety of industrial processes, in the reduction of starting voltages required in fluorescent light tubes and in process control instruments incorporating a source of radiation. Possible future uses which will require 2-5 years' additional development, are reported to be industrial radiography, the cold sterilisation of drugs and foods, and portable low-level power sources. In the speculative area, where the basic technical knowledge necessary for application is still lacking, are radiation chemistry and the study of flame propagation.

The most promising market in the second category, says the Institute's report, is in the cold sterilisation of heat-sensitive drugs and pharmaceuticals. Food sterilisation without heat also suggests many potential markets because the fresh products could not be obtained economically by any other method. The use of α-radiation for sterilising penicillin is described in the report. Each vial receives 2,000,000 Roentgens of radiation, this being the minimum dosage required for sterilisation. Use of fission products for radiation purposes for similar uses would be far cheaper than comparable X-rays, and, moreover, γ-rays have greater penetration than cathode rays from existing machines. The magnitude of the demand is expected to vary with the price. If the price charged were from one to two dollars per curie, the American market would absorb probably several million curies per year. $50-$100 per curie would reduce demand to tens of thousands per year.

Among difficulties likely to be encountered before full use can be made of fission products in industry, the Institute includes the design of processing plants for separating products and the evolution of a form suitable for various purposes, as well as the dissemination of the fundamental knowledge necessary for the development of industrial applications. Among other problems are the mechanics of distribution, patents policy, inspection and reports policy, and safety regulations, the Report estimates.

No Stockpiling Quotas

The Copper-Zinc-Lead Committee of the International Materials Conference at Washington, has announced that it has decided not to recommend any provision for stockpiling requirements at present in view of the demands for defence and essential civilian needs.

Previously, when setting quotas for copper and zinc, the I.M.C. committee recommended in its allocations a small amount of these metals to be placed in the stockpiles of participating countries.

Chemical Exposition in New York

New Substances, Equipment and Processes on View

PREDICTIONS of continued expansion were abundantly confirmed by displays at the 23rd Exposition of Chemical Industries which crowded every square foot of exhibit space available in Grand Central Palace, New York, during the week of 26 November to 1 December. With 457 exhibits the exposition was the largest in the 36-year history of this biennial institution. It encompassed the whole field of chemical influence in the industrial world, and revealed many substances and a great deal of mechanical equipment never before publicly shown.

During the week 47,000 visitors were registered under the invitation plan which excluded the general public and confined attendance to persons having a scientific or business interest in the exhibits.

Influence of the national defence programme and its reaction on civilian affairs was noticeable in production plans. The search for new products and processes goes on vigorously, and the exposition proved that much of the scientific work of the last war was now bearing fruit in new commercial products. This was particularly true of instrumentation to overcome human failings and manpower shortages.

Mechanical Equipment Shown

Mechanical equipment for the process industries occupied the foreground of the exposition and included machinery for the preparation, combination, treatment, refining and finishing of all manner of substances from the raw material to the packaging stage. In many instances the manufacture of equipment represented in one exhibit was complemented by another exhibit representing the operation of a similar kind of equipment. Many forms of grinding and pulverising equipment were shown for example. On the other hand, one specialist in grinding offered information on moulding compounds, plastic granulating, insect dust, metal powders, aluminium chips, sponge rubber, soya beans, spices, soap and bark.

Many exhibits dealt with equipment for the classification of materials, sifting, screening, grading by size and by weight. In this line, a striking innovation was a high-speed, fully automatic scale for classifying, zoning and check weighing. The unique feature of this machine was a dynamic weighing system introduced into a belt conveyor line. Packages, or other units, all alike in kind, were first checked by an indexing device which fed them one by one on to a scale belt where their individual weights operated an electronic device which, as they reached the succeeding distributor belt, caused them to be gated into the proper one of several classifying channels.

New Constructional Materials

Numerous innovations and improvements in materials of construction were revealed during the week. One of the most significant of these was a dual improvement in metal cladding. In the first instance, lead was bonded to steel by a new method, the resulting product being given the name Ferrolum. In the second, called Cupralum, lead and copper were bonded. In both instances the acid-resisting qualities of structurally weak lead were united with the strength of steel or the electrical and heat-conducting properties of copper to produce longer-lasting tanks and piping by controlled production methods.

Cupralum has entered a second great field in the electro-deposition of metals, where the lead-clad copper anode is said to have as much as 10 times the conductivity of an ordinary lead anode. Welding of lead to steel by machine, demonstrated publicly for the first time at the Grand Central Palace, appeared to be a highly significant accomplishment in view of the difference in melting point of the two metals.

The machine, which follows a joint in the lead lining of a tank, or welds the two metals in bands paralleling the seam, consisted of a travelling flame director, which precisely imitates the movement of the torch in the hand of a skilled lead-burner. This rhythmic dip, wipe and lift movement of the flame, as well as the traverse of the machine was effected by simple mechanical means, permitting several machines to be employed gangwise, where a large surface was to be cladded.

An improved acid-resisting glass lining

for storage tanks, chemical reactors, piping, valves, pumps and other equipment was also announced at the exposition, marking the beginning of a thorough-going research into the physical properties affecting the fabrication of the glass lining and its life.

Improved resistance to alkaline solutions in the range of 10 to 12 *p*H and at temperatures below 212°F. was claimed for the new glass compound. Within this range it was stated to have been found to have at least three times the resistance of the manufacturer's present standard glass, and in some instances as much as 10 times the resistance formerly experienced.

New Material for Coatings

Also in the field of protection of surfaces against corrosive attack one industrial concern had developed a versatile intermediate to permit the formulation of coatings for a variety of needs and to meet a corrosion-resistance level considerably higher than that obtainable with most conventional coatings. The new material was now available in semi-commercial quantities and in samples.

Coatings formulated with this intermediate were reported to have remarkable resistance to alkalis, acids, soap solutions, solvents, salts, oxidising agents and other corrosive chemicals over a wide temperature range. They may be brushed, dipped, sprayed or roller-coated and baked in standard equipment with conventional techniques.

Steel shortage has bred a whole new series of shipping containers in the way of improved designs and linings for products in alternate materials or in steel and aluminium of improved construction. As an alternative for the old-fashioned glass 'carboy' there was a stainless steel container of special form, designed to stack, formed of selected types of steel for handling phosphoric acid, concentrated nitric acid, and other strong chemicals.

Another source had produced a 55-gallon stainless steel drum having a patented crevice weld which keeps the contents out of the seams. Also on view were a polyethylene lining, and a sprayed-on thermo-setting resin, chemically resistant to alkali, dilute mineral acids, chlorinated solvents, formaldehyde and detergents.

Among the new equipment exhibited was an Audigage, which employs the ultrasonic resonance method for corrosion inspection on pressure vessels, tanks, stills, pipes, autoclaves and boiler tubes on metal thicknesses from 0.060 to 12.0 in.; and a Podrometer, which employs the potential drop method to serve the same end, and is serviceable on material 0.1 to 1.5 in. in thickness. The Coatigage, which the manufacturer of the other two instruments also produces, measures the thickness of non-magnetic coatings on iron and steel, such as paint, enamel and organic finishes; or scale and coke deposits.

At another booth ultrasonics were used in a liquid level indicator, especially adapted to use on tank farms or other large storage locations. In this instance an ultrasonic transducer located on the floor of the tank sends up to the surface of the liquid pulses of energy transformed from a pulsing electrical input, and receives the echo, which it translates back into electrical energy for indicating and recording purposes. Such feed-back impulses may be transmitted by wire, or even wirelessed, to distant headquarters, where, according to the maker of the equipment, it is possible to have invoices and shipping memoranda automatically printed as contents are withdrawn from the tanks.

Uses of Ultrasonics

Ultrasonic equipment, according to another manufacturer, had found successful applications in accelerating the ageing of alcoholic spirits, stimulation (or destruction) of bacteria, transformation of crystal structures, homogenisation of milk and decomposition of gelatine.

A new piece of equipment in the field of biological products was a recently developed high-speed colloid serum mill. This piece was especially designed for the wet grinding and homogenising of fibrous organic tissues, and substances which, when homogenised under sterile conditions, are used in the preparation of many serums and vaccines.

Another manufacturer had evolved a method for treating grass silage with liquid sulphur dioxide. This treatment, already widely used in the commercial refrigeration and food preservative industries, stops bacterial action without the customary fermentation which reduces the food values in ensilage.

Antibiotics, believed to be still on the threshold of spectacular advances along medicinal and nutritional lines, are now

tentatively proposed for industrial application for the control of moulds, mildew, bacteria and other enemy attacks on textiles, plastics and synthetic fibres, electrical insulation, paints and other surface coatings, processing solutions, plant diseases, food products and in controlling the products of fermentation.

The influence of the chemical industry on the nation's affairs was evidenced by the variety and scope of the products and their wide range of applications.

Examples of metals displayed included pure hafnium and silicon, ductile zirconium, tungsten and titanium. Other items which aroused interest were a table model of the electron microscope, a demonstration of industrial television, which enabled dangerous reactive processes to be viewed from a safe distance, and a metal detector for automatic inspection of sealed packages.

Instruments for production and process control were exhibited in increased number, and revealed an interesting trend in the development of small-sized, almost miniature units in recorders, indicators and controls. In several instances these new designs represented, not simply a re-scaling, but a complete redesign. These smaller instruments were significant, because they are a part of the general development in servo-mechanisms, and because they broadly represented the new science of system engineering.

The exposition was held under the management of the International Exposition Company of New York. Charles F. Roth, president of this company and manager of the exposition, was the principal organiser of the first chemical exposition in 1915. E. K. Stevens, associate manager, has been associated with the management for many years.

Standard for Filter Flasks

A NEW British Standard, for filter flasks (B.S. 1739: 1951) has just been issued. This British Standard is the first to be published for filter flasks, and in its preparation careful attention has been given to the requirements of users and to the manufacturing problems involved. Eight sizes of flask are specified, from 100-ml. to 20-litre nominal capacity. Full dimensions and appropriate tolerances are given, but for a few dimensions temporary tolerances are also listed to cover present production in view of the manufacturers' heavy investment in moulds. For flasks over 250 ml. in nominal capacity an alternative form of vacuum connection is specified, consisting of a detachable side-arm fitted by means of a resilient grommet into a hole in the flask wall. A tapered neck is specified, which is convenient for use with a rubber stopper or can be ground with an interchangeable joint if required, and other clauses cover quality of glass, general construction and wall thickness. Copies of this standard may be obtained from the British Standards Institution, Sales Department, 24 Victoria Street, London, S.W.1, price 2s. post free.

Vigorous Defence Needed

THE continued need for a vigorous defence of the Movement's aims and principles, despite the fact of there being a new Government in power, was stressed by Lord Lyle of Westbourne (president) at the annual general meeting of the Society for Individual Freedom in London.

The enlightenment of the public on the follies of Socialism, said Lord Lyle, was due in no small measure to the work of the Society. 'Though a new Government has been elected, we are by no means out of the wood yet', warned the speaker. The aims and principles of the Society were no less pressing to-day; unless there was a complete breakaway from the legacy of Socialism, this country was in danger of being reduced to the level of a second-rate power.

Lord Lyle, who was re-elected president, said it was an honour and a privilege to be president of this movement and to follow in the footsteps of Sir Ernest Benn, their founder-president, whose fearlessness in defence of freedom for the individual and personal integrity gave them a lead and inspired them to carry on his great work.

Mr. W. J. Brown, who later addressed the assembly, declared that one of the most pressing needs to-day was to reassert the doctrine of individual responsibility and freedom. He recalled Lord Lyle's magnificent stand against nationalisation and the occasion when Mr. Winston Churchill stood alone, undaunted, contented to fight for principle in the political wilderness. 'These two gentlemen set an example of that fine old spirit of the English which is worth more than all the speeches on its value could ever be'.

The Chemist's Bookshelf

CHEMISTRY OF WOOD. Dr. Erik Hägglund. New Revised English edition. Academic Press, New York. 1951. Pp. 631. $13.50.

This book by Dr. Hägglund, of the Swedish Forest Products Research Laboratory, Stockholm, represents the first English edition of 'Holzchemie', the first German edition of which was published in 1928 and the second edition in 1939.

The present volume is essentially a literature review of the many papers which have been published on wood chemistry. But throughout the text there are useful practical points and details incorporated which show that the author is well at home in this particular field. It is worth noting that the date of publication is in April of this year and that the references cover the literature up to late 1950, a very creditable performance considering the volume of material published in this field.

The book is divided into twelve chapters, the first two of which serve as an introduction and discuss wood tissue and the physical properties of wood. Chapter three is by far the largest section of the book and covers wood components and their chemical properties. This chapter is subdivided into sections dealing with cellulose, wood polyoses, lignin, etc. In view of the current interest in the lignin problem it is significant that approximately 140 pages are devoted to this topic alone. The next chapter is on wood saccharification followed by two important chapters on the pulping of wood with sulphites and aqueous alkalis. The remainder of the book is composed of shorter chapters dealing with the carbonisation of wood, the behaviour of wood during storage and the natural decomposition of wood.

From even the most casual inspection of this book one is impressed by two things. The first is the world-wide interest displayed in this topic of wood chemistry and this is reflected by references to journals published in Scandinavia, Great Britain, North America, and Japan. Secondly, one realises how much of the present knowledge of wood chemistry is due to the research of the team of which Dr. Hägglund is a member, but at the same time it should be clearly pointed out that this is not a biased account and due credit has been given to all the other major workers in this field. Closer inspection of the book, particularly the author index, reveals that there are a few errors in the references but otherwise the book is well produced and singularly free from errors. In view of the present day concern for the full utilisation of natural resources, this book can be confidently recommended to anyone whose work brings them in contact with wood chemistry and wood products.—GUY DUTTON.

AN INTRODUCTION TO ORGANIC CHEMISTRY. Revised by Lowy, Harrow and Apfelbaum. Seventh edition. John Wiley & Sons, New York; Chapman & Hall, London. 1951. Pp. XIV + 480. 40s.

This book represents the seventh edition of an introductory text to organic chemistry which may now be considered one of the standard books of its kind in the United States. The book is designed to cover the fundamentals of organic chemistry for those students who do not intend to specialise in chemistry but rather in some related field such as dentistry, pharmacy or the biological sciences. The whole field is adequately surveyed although it may be considered that in places a condensed treatment has been given at the expense of the general principles, thus leaving the student with the impression that he has to learn a whole list of compounds.

The main changes in this edition are an extension of the section on aliphatic hydrocarbons and a more extensive treatment of plastics. The book is clearly printed and well produced but it is doubtful if it is worth the price judged by other English textbooks of the same scope and standard.—G.G.S.D.

• OVERSEAS •

Fertiliser Credits

The Argentine Central Bank has modified its regulations to include the extension of credit for the purchase of organic fertilisers from the packing plants and also for the purchase of chemical fertilisers. Requests for loans are to be made through the local branches of the Banco de la Nación, and will bear an interest rate of five per cent per annum. The term of the credit is for two years with amortization of 50 per cent each year.

U.S. Accidents Increase

U.S. Bureau of Labour statistics state that the industrial accident rate in American industry is rising rapidly, and was 16 per cent higher in the first three months of this year than in the corresponding period a year ago. The faster tempo of industrial activity due to defence production is blamed for the increase. Employers have had to employ inexperienced workers in many places, and these are more likely to be injured than those well acquainted with the occupational hazards involved. Longer hours of work are also thought to be a contributory cause of the rise in accident rate.

Brazilian Steel Works

From Sao Paulo it is announced that preliminary studies are being made regarding the erection of a steel works with a capacity equal to that of the Volta Redonda works. A new company would be formed with a capital of Cr.5,000,000,000 one-half of which would be subscribed by the State Government and the remaining 50 per cent by Sao Paulo industrialists. The proposed plant would be located at Piassaguera, near Santos, and supplies of iron ore and coal would be received by sea, the former from Vitoria and the latter from Santa Caterina or abroad.

Steel production in Brazil has rapidly increased and now represents more than two-thirds of Brazil's total consumption. Although the official plan to double production at the Volta Redonda plant would mean a total output of 1,200,000 tons a year, substantial foreign supplies would still be required as consumption is expected to rise to 1,500,000 tons per annum.

Chilean Nitrates

Following a visit of Chilean officials to the nitrate zone, it is reported that production on two properties will be increased by 4,000 tons annually by the introduction of the solar radiation system. It is also reported that a new sulphite plant will commence to function in the middle of 1952. For this new installation a total expenditure of U.S. $180,000,000 is anticipated, of which around U.S. $60,000,000 has already been invested by the owning corporation.

Cast Iron Desulphurised

A new process that desulphurises cast iron through the use of calcium carbide has recently been developed in the U.S. by Airco Research and Technical Sales. Sulphur in cast iron has harmful effects on its tensile strength, impact resistance and castability, and calcium carbide has been known as a desulphuriser before. The technique of bringing it into intimate mixture with the molten iron, however, is the new contribution to the process. Laboratory-scale methods have been successful in the past, but now a commercial procedure has been developed. Pilot plant tests are reported to be successful.

Canadian Carbon Black

Cabot Carbon of Canada, Ltd., are shortly going to erect at Sarnia, Ontario, an oil furnace carbon black plant of 20 million lbs. capacity and costing about $2,000,000 which will be provided by Godfrey L. Cabot, Inc., of Boston, Mass., the world's largest manufacturer of carbon black. This will produce primarily HAF high abrasion furnace blacks, which are widely used in the Canadian rubber industry. Provision will also be made for manufacture of FEF, fast extruding furnace blacks, and other types as needed by the industry. Raw materials will come from refineries in the United States until the rapidly expanding Canadian refinery industry is able to supply the proper quality and type of aromatic liquid hydrocarbons, as these will be used instead of the traditional natural gas. The plant will be equipped with a complete smoke elimination system.

HOME

Edinburgh Cereals Conference

A conference organised by the Food and Agricultural Groups of the Society of Chemical Industry will be held at Edinburgh on 8-10 May, 1952. It is expected that approximately 15 papers will be read and that there will be two visits of industrial and agricultural interest. An informal dinner will be held on the evening of 8 May.

Included on the provisional programme are papers on cereal agronomy, grain protection, the value of cereals as food, malting systems, seed testing and the by-products of wheat.

Education for Technology

At a buffet-lunch meeting of the Industrial Co-Partnership Association, held at the Assembly Hall of the Royal Empire Society, London, on Wednesday, 19 December, Mr. Frederick Bray, C.B., M.A., Under-Secretary for Technical Education, Ministry of Education, gave an address 'Education for Technology in the U.S.A.' The chair was taken by Sir Ernest Smith, Technical Director, Imperial Chemical Industries Ltd.

Mr. Bray was a member of the team which visited America under the auspices of the Anglo-American Council of Productivity and whose report was published last month.

Tuberculosis Conference

One of the forthcoming medical events of 1952 will be the Third Commonwealth and Empire Health and Tuberculosis Conference to be held at the Central Hall, London, 8-13 July. It is open to all interested in preventive medicine including commercial and industrial executives and will include an exhibition of X-ray apparatus, medical equipment, pharmaceutical products, art therapy, etc. In addition to a number of lectures there will also be visits to various hospitals, clinics and sanatoria, films and tours of general interest.

The fee is £4 4s. for the whole conference or 30s. for a single day or session. Intending delegates should send their names to the Secretary-General, National Association for the Prevention of Tuberculosis, Tavistock House, Tavistock Square, London, W.C.2.

Chemical Works Fire

Fire broke out on 11 December on the premises of C. W. Field, Ltd., manufacturing chemists, Edwards Lane, Speke. The building, situated at the rear of the main factory, contained about 30 tons of quillaja bark, the powder of which provides an extract for chemical foam fire extinguishers, also the grinding and extraction plant. It was stated by an official of the firm that the plant could be salvaged and that it was hoped full production would be resumed within a few days.

Time of Meeting Changed

The Fertiliser Society announces that the time of its next general meeting at Caxton Hall, Westminster, London, on 10 January, has been advanced to 2.15 p.m., instead of 2.30 p.m. as previously stated. The following papers will be read, and discussed: Dr. J. H. Homence: 'Recent Advances in N.P.K. Analysis; R. Donald: 'A Review of the Methods for the Determination of Potash'; W. C. Hanson: 'The Determination of Potash by the Dipicrylamine Method.'

Winding Up Directorate

The Directorate of Nitrogen Supplies will come to an end on 31 December 1951. As from 1 January, 1952, matters concerning the production of ammonia and the provision of ammonia to industry, including the fertiliser industry, will be the responsibility of the Ministry of Materials, Divison 2, Branch 2A, at Horse Guards Avenue, S.W.1.

Matters relating to the production and distribution of fertilisers within the United Kingdom will be dealt with by the Directorate of Fertiliser Supplies, 56 Mount Ephraim, Tunbridge Wells, Kent.

Locust Control by Flooding?

Control of locusts was the subject of a talk given at the Royal Society of Arts, London, on 18 December by Dr. D. L. Gunn, principal scientific officer at the Anti-Locust Control Centre. Although the red (African) locust was now being kept down by chemical means, the speaker suggested the next step might be the widespread use of flooding dangerous areas to prevent the formation of swarms of the insects.

• PERSONAL •

MR. HUGH BECK, B.Sc., A.M.I.Mech.E., M.I.Mar.E., London office manager of Crossley Brothers, Ltd., diesel engine manufacturers, Openshaw, Manchester, has been appointed to a seat on the board of directors as from 19 November, 1951.

MISS FLORENCE ELIZABETH JEWITT, Divisional Nursing Officer at I.C.I., Ltd., Billingham, has been awarded the Sir James Knott Travelling Scholarship for 1951-52 by the Council of British Commonwealth and Empire Nurses' War Memorial Fund, enabling her to visit America and Canada. Miss Jewitt expects to take up her scholarship in the New Year when she will study industrial nursing methods of factories in New York, Pittsburgh, Connecticut and Toronto.

MR. LAWRENCE WEAVER has severed his connection with Brotherton & Co., Ltd., and as from 13 December, 1951, ceases to be commercial manager and a director of the company. MR. J. T. BARRIE and MR. W. F. DUNNETT have joined the board of the company.

Richard Sutcliffe, Ltd., the Wakefield specialists in belt conveying, have announced the appointment of MR. R. D. BROWN, A.M.I.C.E., formerly their European representative, as sales manager.

One of America's foremost atomic scientists, DR. FARRINGTON DANIELS, professor of chemistry at the University of Wisconsin, has been chosen president-elect of the American Chemical Society. He will head the society in 1953. President next year will be DR. EDGAR C. BRITTON, director of the organic research laboratory of the Dow Chemical Company, Midland, Michigan, who will take office on 1 January, succeeding PROFESSOR N. HOWELL FURMAN, chairman of the department of chemistry at Princeton University. Professor Daniels, who was nominated for the office at the society's Diamond Jubilee meeting in New York last September, was elected in a national vote by its 67,000 chemists and chemical engineers. He achieved wide recognition through his work on atomic energy during the last war. From 1945 to 1946 he was director of the Metallurgical Laboratory at the University of Chicago, where much of the research for the Manhattan Project was conducted, and for the following two years he was chairman of the board of governors of the Atomic Energy Commission's Argonne National Laboratory. Other fields in which he has made notable contributions include nitrogen fixation, the conversion of atmospheric nitrogen for use in fertilisers and explosives; photosynthesis, and the utilisation of solar energy.

MR. T. H. SUMMERSON has been elected chairman of the British Steel Founders' Association in succession to MR. F. ROWE.

Mr. Summerson has been vice-chairman of the association since 1949. He is chairman and joint managing director of Summerson's Foundries.

RICHARD H. WILHELM, Professor of chemical engineering at Princeton University, received the William H. Walker Award of the American Institute of Chemical Engineers on 4 December as recognition of his achievements in chemical engineering.

Professor Wilhelm was chosen on the basis of 'his excellent publication record over the years and for recent outstanding contributions' to the literature of the chemical engineering field.

Professor Wilhelm is at present a member of the management committee of Chemical Sciences Laboratory of Princeton's newly founded Forrestal Research Centre, and is a consultant to the Research and Development Board of the Department of Defence, and to various chemical companies.

CHARLES R. WILKE, associate professor of chemical engineering at the University of California, Berkeley, has been chosen by the American Institute of Chemical Engineers as this year's winner of their Junior Award.

The honour is given for outstanding contributions to the literature of chemical engineering, and Professor Wilke received the award on 4 December at an Institute banquet in Atlantic City. DR. THOMAS H. CHILTON, president of the A.I.Ch.E., made the presentation.

Publications & Announcements

DESIGNED to overcome the effect of the present wide variations of mains voltage and frequency on the temperature control of electrically heated furnaces is the new Sunvic Resistance Thermometer Controller, Type R.T.2, now in production. The variations are overcome by the incorporation of the Sunvic Energy Regulator principle in the output circuit of the controller. This principle compensates for the change of control point which would otherwise accompany change of supply voltage. The controller is arranged for mounting in standard P.O. racks, the front plate being half standard rack size. A neon lamp is provided to indicate the position of the load contacts and a bridge balancing potentiometer and sensitivity control are available on the front of the case. Two industrial type vacuum valves are used and no electrolytic capacitors are employed.

* * *

THE Federated Metals Division of the American Smelting and Refining Company, 120 Broadway, New York 5, N.Y., offers in a 34-page booklet comprehensive information on solder, its nature and uses. The abundantly illustrated booklet covers thermal effects, mechanical properties and principles of soldering; the various fluxes with their practical applications; and fusible alloys of low melting point. It also contains numerous technical data in which specifications and permissible variations in chemical composition, their melting ranges and standards are given in tabular form.

* * *

WITH the recent change in the board and management of Messrs. Wm. Gardner & Sons (Glos.), Ltd., the reorganisation of their factory is being completed for the production of a redesigned range of machinery.

This company, which was founded in 1860, was one of the first manufacturers of sifting, mixing and grinding machinery for a number of industries. The self-raising flour industry was based on these machines. Since then, the machines have become famous throughout the world and are used in innumerable industries.

Based on this considerable experience, the redesign of their complete range was commenced over a year ago to make each machine a self-contained unit incorporating the latest improvements for easier cleaning out, greater accessibility and a further reduction in the time required for maintenance and attention. These machines are now constructed of prefabricated steel, are totally enclosed for dust-free operation and have self-contained power units.

Having been subjected to tests and practical operation for some time, the machines are now going into full-scale production as standard units. The company, however, still maintain their policy of experimenting and testing customers' particular products for the manufacture of special machines where necessary.

* * *

THE Ajax Metal Division, Frankford Avenue, Philadelphia 23, Pa., have issued a 20-page booklet which deals with the use of phosphor copper as a deoxidiser and hardener for bronze and brass alloys. As so little has appeared telling when, why and how to use phosphor copper and which are its real and significant functions in foundries and mills, this booklet covers much useful information on the subject.

* * *

THE Industrial Diamond Trade Names Index for 1951-52 for users of diamond tools, hard abrasives, sintered carbides, and materials for the precision engineer has recently been published (N.A.G. Press, Ltd., 226 Latymer Court, Hammersmith, London, W.6. Price 3s. 6d.). This handy list was compiled jointly by the Industrial Diamond Information Bureau and the *Industrial Diamond Review*. It contains a classified subject index as well as an alphabetical name index.

* * *

OUTPUT of tinplate at a rate of 8,000,000 tons a year by 1961 is forecast in an article on the growth of the tinplate industry in the current issue of *Tin and Its Uses* (No. 25), a periodical review published by the Tin Research Institute, Greenford, Middlesex. Some of the technical advances in the tinplate industry are summarised, and there is an impressive photograph of the new Trostre plant of the Steel Company of Wales.

British Chemical Prices

LONDON.—After a long period of sustained activity, conditions in the industrial commercial markets have been comparatively quiet during the past week. Even if the demand is less pronounced, the price position remains strong and such alterations as have been notified at the time of this report show higher rates to operate as from 1 January for oxalic acid, formaldehyde, formic acid, caustic potash and sodium nitrite. A steady inquiry for shipment has been reported. In the coal tar products market, most items are in short supply with pyridine and creosote oil in strong demand. New prices for naphthalene have been announced to come into operation on 1 January, 1952.

MANCHESTER.—Fairly active trading conditions have been reported during the past week with most home-trade users specifying for steady deliveries of the alkalis and other heavy products. There has also been a fair amount of new inquiry on home-trade account. Shippers have been in the market with additional orders and export contracts are mostly being drawn against steadily. The tone of the market is firm generally, outstanding change being the sharp rise in acetone. Moderate buying interest has been reported in the fertiliser section, with brisk trading conditions experienced in most sections of the market for the light and heavy by-products.

GLASGOW.—The uplift experienced in trade last week has been maintained. Certain price increases have been notified but this has not in any way curtailed demand. Manufacturers on the whole are extremely busy, although some anxiety is being experienced by consumers of sulphur derivatives owing to the fact that it is not possible for manufacturers to commit themselves for contract quantities for 1952, but as these conditions prevailed last year it is felt that the demand will probably be met. The demand for export remains and it has been reported that a steady trade is being done.

General Chemicals

Acetic Acid.—Per ton : 80% technical, 1 ton, £110 ; 80% pure, 1 ton, £116 ; commercial glacial 1 ton, £130 ; delivered buyers' premises in returnable barrels ; in glass carboys, £7 ; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £166 per ton.

Acetone.—Small lots : 5 gal. drums, £145 per ton ; 10 gal. drums, £135 per ton. In 40/50 gal. drums less than 1 ton, £115 per ton ; 1 to 9 tons, £114 per ton ; 10 to 49 tons, to £113 per ton ; 50 tons and over, £112 per ton.

Alcohol, Industrial Absolute.—50,000 gal. lots. d/d, 4s. 7½d. per proof gallon ; 5000 gal. lots, d/d, 4s. 8½d. per proof gal.

Alcohol, Diacetone.—Small lots : 5 gal. drums, £133 per ton ; 10 gal. drums, £128 per ton. In 40/45 gal. drums : less than 1 ton, £113 per ton ; 1 to 9 tons, £112 per ton ; 10 to 50 tons, £111 per ton ; 50 to 100 tons, £110 per ton ; 100 tons and over, £109 per ton.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER : Ground, £17 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER : £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non-returnable drums ; 1 ton lots £47 per ton.

Ammonium Chloride. — Grey galvanising, £27 10s. per ton, in casks, ex wharf. Fine white 98%, £21 10s. to £22 10s. per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate. — MANCHESTER : £5 15s. per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £93 and £91 10s. per ton.

Antimony Sulphide.—Golden, d/d in 5 cwt. lots as to grade, etc., 2s. 6½d. to 3s. 7½d. per lb. Crimson, 4s. to 5s. 4½d. per lb.

Arsenic.—Per ton, £44 5s. to £47 5s., ex store.

Barium Carbonate.—Precip., d/d ; 2-ton lots, £33 5s. per ton, bag packing.

Barium Chloride.—£40 10s. 2 ton lots d/d bags.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £41 per ton d/d ; 2-ton lots, £41 5s. per ton d/d.

Bleaching Powder.—£19 10s. per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140-lb. bags, carriage paid: Anhydrous, £59 10s.; in 1-cwt. bags; commercial, granular, £38 10s.; crystal, £42; powder, £43; extra fine powder, £44; B.P., granular, £48 10s.; crystal, £51; powder, £52; extra fine powder £53.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granular, £68; crystal, £76; powder, £73 10s.; extra fine powder, £75 10s.; B.P., granular, £81; crystal, £88; powder, £85 10s.; extra fine powder, £87 10s.

Butyl Acetate BSS.—£263 per ton, in 10-ton lots.

Butyl Alcohol BSS.—£250 per ton, in 10-ton lots.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid £9 12s. 6d. per ton, in 4-ton lots.

Charcoal, Lump.—£26 to £28 per ton, ex wharf. Granulated, £35 to £40 per ton.

Chlorine, Liquid.—£28 10s. per ton d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 6d. per lb.

Chromic Acid.—1s. 11d. to 1s. 11½d. per lb., less 2½%, d/d U.K.

Citric Acid.—1 cwt. lots, 218s. cwt. 5 cwt. lots, 213s. cwt.

Cobalt Oxide.—Black, delivered, 13s. per lb.

Copper Carbonate.—MANCHESTER: 2s. 6d. per lb.

Copper Chloride.—(63%), d/d, 2s. 9d. per lb.

Copper Oxide.—Black, powdered, about 1s. 4½d. per lb.

Copper Nitrate.—(63%), d/d, 2s. 8d. per lb.

Copper Sulphate.—£103 12s. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £12 12s. d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £174 per ton.

Formaldehyde.—£33 15s. per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £79 10s. 4 ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1,260 s.g. £14 9s. 0d. per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 3d. to 2s. 6d. per lb.; bulk carriage paid.

Hydrochloric Acid.—Spot, 9s. 6d. to 10s. 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—27.5% wt. £116 per ton. 35% wt. £146 per ton d/d. Carboys extra and returnable.

Iodine.—Resublimed B.P., 21s. 3d. per lb. in cwt. lots.

Iodoform.—25s. 4d. per lb. in cwt. lots.

Iron Sulphate.—f.o.r. works, £3 15s. to £4 5s. per ton. Bags free.

Lactic Acid.—Pale tech., 44 per cent by weight £130 per ton; dark tech., 44 per cent by weight £100 per ton ex works; Usual container terms.

Lead Acetate.—White: £194 10s. per ton.

Lead Carbonate.—Nominal.

Lead Nitrate.—£161 10s. per ton.

Lead, Red.—Basis prices per ton: Genuine dry red lead, £194; orange lead, £206. Ground in oil: red, £215; orange, £227.

Lead, White.—Basis prices: Dry English, in 8-cwt. casks, £200 10s. per ton. Ground in oil: English, under 2 tons, £216 10s.

Lime Acetate.—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82%, ton lots, d/d, £22 to £25 per ton.

Litharge.—£194 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £27.

Magnesium Carbonate.—Light, commercial, d/d, £87 15s.; cwt. lots £97 10s. per ton d/d.

Magnesium Chloride.—Solid (ex wharf), £15 per ton.

Magnesium Oxide.—Light, commercial, d/d, £221; cwt. lots £227 10s. per ton d/d.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., lump, 10s. 8d.; smaller quantities dearer.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 7s. 10d. per gal. ; pyridinised 64° O.P. 100 gal., 7s. 11½d. per gal.

Nickel Sulphate.—Deld. buyers U.K. £140 10s. per ton.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—About £179 10s. per ton, packed in 5-cwt. lots, packed in free 5-cwt. casks.

Paraffin Wax.—Minimum 1-ton lots £76 5s. ; smaller quantities £77.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £75 10s. per ton ; B.P. (S.G. 1.750), ton lots, carriage paid, 1s. 5½d. per lb.

Potash, Caustic.—Solid, £198 10s. per ton for 1-ton lots ; Liquid, £37 15s.

Potassium Bichromate.—Crystals and granular, 11⅛d. per lb. ; ground, 10⅝d. per lb., standard quantities.

Potassium Carbonate.—Calcined, 98/100%, £88 10s. per ton for 1-ton lots, ex store ; hydrated, £81 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96%, 6-ton lots, £16 10s. per ton.

Potassium Iodide.—B.P., 18s. 7d. per lb. in 28 lb. lots.

Potassium Nitrate.—Small granular crystals, 81s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 7½d. per lb. for 1-cwt. lots ; for 3 cwt. and upwards, 1s. 6½d. per lb. ; technical, £8 3s. per cwt. ; for 5 cwt. lots.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—Dog-tooth crystals, £72 10s. per ton ; medium, £67 10s. per ton ; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid. — MANCHESTER : Technical 2s. 7d. to 2s. 10d. per lb. d/d.

Soda Ash.—58% ex depôt or d/d, London station, £8 17s. 3d. to £10 14s. 6d. per ton.

Soda, Caustic.—Solid 76/77% ; spot, £21 12s. 6d. per ton d/d. (4 ton lots).

Sodium Acetate.—£85 to £91 per ton d/d.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 9d. per lb. ; anhydrous, 9¼d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite.—Powder, 60/62%, £40 per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£87 to £95 per ton.

Sodium Cyanide.—100% basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals £28 a ton ; commercial, 1-ton lots, £26 per ton carriage paid.

Sodium Iodide.—B.P., 20s. 1d. per lb., in 28 lb. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £123 ton.

Sodium Metasilicate.—£21 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98%, 6-ton lots, d/d station, £30 10s. per ton.

Sodium Nitrite.—£31 for 1 ton lots.

Sodium Percarbonate.—12½% available oxygen, £8 4s. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots : Di-sodium, crystalline, £37 10s., anhydrous, £78 10s. ; tri-sodium, crystalline, £39 10s., anhydrous, £75 10s.

Sodium Prussiate.—10d. to 10½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER : £6 10s. per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot. £27 per ton, d/d, in drums ; broken, £27 15s. per ton, d/d, in drums.

Sodium Sulphite.—Anhydrous, £57 12s. 6d. per ton ; pea crystals, £36 7s. 6d. per ton d/d station in kegs ; commercial, £22 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £25 18s. 6d. to £28 8s. according to fineness.

Tartaric Acid.—Per cwt. : 10 cwt. or more, £15 10s.

Tin Oxide.—1-cwt. lots d/d £25 10s. (Nominal.)

Titanium Oxide.—Comm., ton lots, d/d (56-lb. /112 lb. bags), £115 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d ; white seal, £207 10s. ; green seal, £206 10s. ; red seal, £205.

Zinc Sulphate.—Nominal.

Rubber Chemicals

Antimony Sulphide.—Golden, 2s. 6½d. to 3s. 7½d. per lb. Crimson, 4s. to 5s. 4½d. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Off colour, ex store. Imported £13 10s per ton. Extra white bleached ex store, £16 10s.

Cadmium Sulphide.—About 20s. per lb.

Carbon Bisulphide.—£65 5s. per ton, according to quality.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£69 10s. per ton.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 1s. 9½d. to 2s. 3d. per lb. ; dark, 1s. 8½d. to 2s. 1½d. per lb.

Lithopone.—30%, £75 15s. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, 'Rupron.'—£20 per ton.

Sulphur Chloride.—British 48s. 6d. per cwt.; Imported £120 per ton.

Vegetable Lamp Black.—£49 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, £15 12s.

Compound Fertilisers.—Per ton in 6 ton lots, d/d farmer's nearest station, I.C.I. Special No. 1, £26 9s. 6d.

'Nitro-Chalk.'—£12 9s. 6d. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean agricultural for 6-ton lots d/d nearest station, £30 10s. per ton.

Coal-Tar Products

Benzol.—Per gal, ex works : 90's, 3s. 8½d. ; pure, 3s. 11½d. ; nitration grade, 4s. 2½d.

Carbolic Acid.—Crystals, 1s. 6d. to 1s. 8d. per lb. Crude, 60's, 8s. MANCHESTER : Crystals, 1s. 6½d. to 1s. 8d. per lb., d/d crude, 5s. 9d., naked, at works.

Creosote.—Home trade, 10d. to 1s. 2d. per gal., according to quality, f.o.r. maker's works. MANCHESTER : 9½d. to 1s. per gal.

Cresylic Acid.—Pale 98%, 5s. 8d. per gal. ; 99.5/100%, 5s. 10d. American, duty free, for export, 10s. naked at works.

Naphtha.—Solvent, 90/160°, 4s. 2½d. per gal. for 1000-gal. lots ; heavy, 90/190°, 3s. 8d. per gal. for 1000-gal. lots, d/d. Drums extra : higher prices for smaller lots.

Naphthalene.—Crude, ton lots, in sellers' bags, £18 16s. 3d. to £34 per ton according to m.p. ; hot-pressed, £50 to £60 per ton, in bulk ex works ; purified crystals, £68 10s. to £79 3s. 4d. per ton.

Pitch.—Medium, soft, home trade, 130s. per ton f.o.r. suppliers' works ; export trade, 200s. per ton f.o.b. suppliers' port. MANCHESTER : £6 10s. f.o.r.

Pyridine.—90/160°, 35s. per gal. MANCHESTER : 35s. to 40s. per gal.

Toluol.—Pure, 4s. 7½d. per gal. MANCHESTER : Pure, 4s. 7½d. per gal. naked.

Xylol.—For 1000-gal. lots, 5s. 1½d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton ; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d. per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d. to 5s. 6d. per gal. ; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediate and Dyes (Prices Nominal)

***m*-Cresol 98/100%.**—3s. 9d. per lb. d/d.

***o*-Cresol 30/31° C.**—1s. 4d. per lb. d/d.

***p*-Cresol 34/35° C.**—3s. 9d. per lb. d/d.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb. ; 66/68° C., 1s.

***p*-Nitraniline.**—2s. 11d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb. ; P.G. 1s. 0½d. per lb.

***o*-Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

***p*-Toluidine.**—2s. 2d. per lb., in casks.

***m*-Xylidine Acetate.**—4s. 5d. per lb., 100%.

We engineer and make complete plant for

PRODUCING or CONCENTRATING

sulphuric acid

BAMAG LIMITED

The Chemical Engineers for Complete Installations

RICKETT STREET, LONDON, S.W.6 Telephone: FULham 7761 · Cables: Bamag, London

Chemical & Allied Stocks & Shares

STOCK markets are closing 1951 firmly with a rallying tendency in most sections, led by British Funds, which have regained part of the heavy fall that followed the raising of the Bank rate and the resulting adjustment of the general yield structure of securities to a higher basis. War Loan 3½ per cent fell below the 80 level at one time and the yield was virtually 4½ per cent; but this attracted buyers on the view that British Funds had gone to too high a yield basis unless a further raising of the Bank rate was likely in the near future. The belief has now gained ground that a further Bank rate increase is unlikely for the present. It is contended that the steps already taken, combined with the tightening of credit facilities by the banks, and the limiting of new capital issues to essential purposes by the Capital Issues Committee, will achieve the Government's object of checking inflation. Moreover, payment of the principal and interest due on the U.S. and Canadian loans have increased confidence.

Partial Recovery

Because of these hopeful views, industrial shares, as well as British Funds, which a few weeks ago were at their lowest levels touched in 1951, have now shown a partial recovery. It is realised that the outlook is still uncertain and that there are many problems ahead, but in general the market believes that leading industrial companies will be able to maintain dividend payments. Increases are expected in some cases, but it is recognised that competition is growing, that profit margins are falling, and that many companies will have to postpone expansion plans unless the Capital Issues Committee regards them as essential and grants permission to raise fresh capital. Moreover, E.P.T. will bear heavily on increased profits, if as is expected in the City, it is at 100 per cent on profits over the average of the past three years. Many companies may be uncertain as to their dividend policy over the next few months, because although E.P.T. will come into force as from 1 January, the rate of this new tax may not be announced until the Budget. Generally, however, the market believes that chemical and kindred companies will maintain their dvidends; and on this basis there are good yields at current prices.

As was to be expected, chemical and allied shares moved very closely with the general trend on the Stock Exchange during 1951. Imperial Chemical are 48s. at the time of writing, compared with highest and lowest levels of 54s. 7½d., and 42s. during the year. Monsanto are now 25s. 9d. compared with the year's highest and lowest of 30s. 7½d. and 16s. 7½d. Laporte 5s. shares are now 11s. 6d., compared with 1951 highest and lowest of 13s. 3d. and 9s. 10½d. Boots Drug have been up to 29s. 3d. and down to 22s. 6d. and are now 23s. Eaglescliffe Chemical 5s. shares, in which dealings started on the Stock Exchange in 1951, are now 18s. They moved between 19s. 9d. and 17s. 6d. during the year.

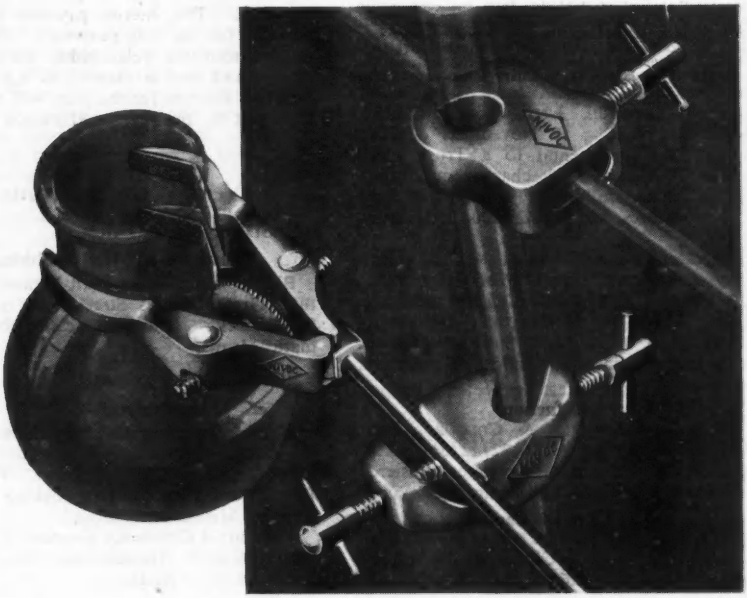
Share Fluctuations

Albright & Wilson are now 18s. 6d. compared with the year's highest and lowest of 23s. 7½d. and 15s. 1½d. Boake Roberts are 18s. 1½d. (1951 extremes were 20s. 3d. and 15s. 9d.), and William Blythe 3s. shares, which have been up to 12s. 10½d. and down to 8s. 3d. are 11s. 10½d. at the time of writing. Borax Consolidated have been up to 39s. and down to 28s. and are now 34s. 3d. British Glues & Chemicals, which have moved between 8s. 9d. and 15s. 9d. since the share bonus distribution, are now 14s. 6d.

Brotherton, now 24s. 4½d., have had extremes of 27s. 6d. and 21s. in 1951. Extremes for Fisons were 34s. 4½d. and 24s. 6d. and the current level is 30s. 6d. Glaxo Laboratories moved between 58s. 6d. and 91s. 10½d. in 1951 and are 79s. 4½d. at the time of writing. Hardman & Holden are now 25s. 7½d., compared with 1951 highest and lowest levels of 29s. 6d. and 24s. 9d. Greeff-Chemicals are now 17s. 6d.; extremes in the year were 20s. 4½d. and 13s. 9d. Lever & Unilever now 50s. have been up to 58s. 1½d. and down to 40s. 4½d. during the year. Erinoid have been 12s. 6d. and 8s. during the year and are now 8s. 6d. British Industrial Plastics moved between 5s. 9d. and 8s. 6d. and are now 6s. United Molasses are now 37s. (the year's highest and lowest were 42s. and 23s. 10½d.). The units of the Distillers Co., now 21s. 6d., have been up to 25s. 1½d. in 1951 and down to 19s. 1½d.

Laboratory CLAMPS and BOSSES

NIVOC Clamps and Bosses, rock steady in use, give a positive grip unequalled by the many similar appliances offered to the laboratory worker. Particularly when used in conjunction with the new Nivoc "Kemiframe" they make possible the set-up of all types of apparatus, easily and quickly.



Nivoc Universal Clamp (No. A1362M), with side screw or thumb wheel control, capacity 0-3½", five point contact. (Patent No. 631075 and 631093). Each 7/-.

Nivoc Single Screw Boss (No. ND121), capacity : (stems) $\frac{3}{16}$"-$\frac{5}{16}$". (uprights) $\frac{7}{16}$"-½". (Patented). Each 3/-.

Nivoc Laboratory Bosshead (No. A1366M) (Registered Design), ½", 2/9, ⅝" 4/- Each

Please write for fully descriptive leaflets.

W & J GEORGE & BECKER LTD

NIVOC HOUSE,
EALING ROAD, ALPERTON, WEMBLEY, MIDDLESEX.
Telephone PERivale 3344 Telegrams NIVOC WEMBLEY

157 GREAT CHARLES STREET, BIRMINGHAM, 3.
Telephone CENtral 7641 Telegrams CHEMISTRY BIRMINGHAM 3

LABORATORY FURNISHERS AND MANUFACTURERS OF SCIENTIFIC APPARATUS

W 60

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered: In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

PEST CONTROL, LTD., Bourn (Camb.). (M., 22/12/51). 13 November, deed of assurance supplemental to a Trust Deed dated 31 March, 1950; charged on Church Farm and certain land at Hauxton with fixed plant, fixtures, etc. *£629,100. 11 May, 1951.

SEVERN BRIDGE FERTILISERS, LTD. (formerly ORGAHUME, LTD.), Worcester. (M., 22/12/51). 19 November, £1,500 mortgage, to H. Wragg, Withington (Hereford), charged on 3 St. Mary Street, Worcester, and land adjoining. *£575. 31 August, 1950.

Satisfaction

RILEY'S CHEMICALS & COLOURS, LTD., Clayton-le-Moors. (M.S., 22/12/51). Satisfaction, 22 November, of charges registered 5 March, 1937, and 12 January, 1938.

Increase of Capital

The following increase of capital has been announced: Metal Chemical Treatments Ltd., from £100 to £6,552.

New Registration

Industrial Polymers, Ltd.

Private company. (502,143). Capital £1,000. Wholesale and retail dealers in fine and heavy chemicals, intermediates, pharmaceuticals, dyes and pigments, synthetic resins and plastics, etc. Subscribers: A. M. Mallinson and E. M. Stableford. Solicitors: Slaughter & May, 18 Austin Friars, E.C.2.

Polythene (Reclamation), Ltd.

Private company. (502,260). Capital £1,000. Re-process and refine all types of polyethylene scrap and mixtures, etc. Directors: J. Hayward, Mrs. A. Hayward, D. Hayward. Reg. office: Carlton House, 69 Wigmore Street, W.1.

Company News

The Distillers Company

The directors of The Distillers Company Limited have declared an interim dividend on the Ordinary Stock for the year ending 31 March 1952, at three and three fifths pence per unit of 4s., less income tax at the rate of 9s. 6d. per £, payable 28 February 1952. The interim payment has been adjusted for the sole purpose of effecting a more reasonable relationship between the interim and final dividends and is no indication that the rate for the year will be higher than that for the year to 31 March 1951.

Next Week's Events

TUESDAY 1 JANUARY

Institute of Metal Finishing

Birmingham: James Watt Memorial Institute, Great Charles Street, 6.30 p.m. Dr. S. Wernick: 'Paint Application by Automatic Means.'

THURSDAY 3 JANUARY

Institute of Metals

Birmingham: Visit to Metallurgical laboratories, Birmingham University, 2.30 p.m. Informal discussion on: 'Tool and Die Materials for the Hot-working of Non-Ferrous Metals and Alloys.'

London: 4 Grosvenor Gardens, S.W.1, 7.0 p.m. W. C. F. Hessenberg: 'Research on the Working of Metals.'

Leeds Metallurgical Society

Leeds: University, 7.0 p.m. Dr. J. C. Chaston: 'The Platinum Metals, Their Properties and Uses.'

FRIDAY 4 JANUARY

British Paper and Board Makers' Association

Manchester: Engineers' Club, Albert Square, 7.0 p.m. A. F. Williams: 'Application of Chromatography to the Paper Industry.'

SATURDAY 5 JANUARY

Textile Institute

Manchester: Midland Hotel. Annual dinner and dance.

New Anti-Pollution Method

A NEW method of solving lake and stream pollution problems at less than one-third of the cost of present methods was described at the 44th annual meeting of the American Institute of Chemical Engineers at Atlantic City on 3 December. Dr. Clyde C. DeWitt, Professor of Chemical Engineering and Director of the Engineering Experimental Station at Michigan State College, told of a new method developed by the Engineering Experiment Station for removing waste and sewage from water before it is returned to lakes and streams.

The new method, adapted from the process used by some paper mills, employs an operation similar to that used in making carbonated beverages, in that it traps air in the waste water under pressure. When the pressure is released, millions of tiny bubbles rush to the surface just as they do when a bottle of soda water is opened. These bubbles carry with them practically every bit of the chemically treated waste material which is suspended in the water, and the water, which is then said to be crystal clear, is allowed to return to a lake or stream.

At present many industries are unable to do a good job of removing waste from the water they use, because many waste products such as oils, very fine metal particles, and fibres will not quickly settle out of the waste water and are not effected by bacterial action.

Non-Ferrous Scrap Prices

THE Minister of Supply (Mr. Duncan Sandys) has made an Order bringing secondary unwrought copper under price control and reducing the controlled prices of secondary copper alloys.

The copper prices will be equivalent to the Ministry of Material's selling prices for virgin copper, and to permit the production of refined copper at these prices, the prices of copper scrap are being reduced by £8 a ton. Prices of copper alloy scrap are being reduced in proportion to the copper content.

The Order contains a provision permitting contracts already entered into at higher prices to be completed within a certain time, and permits additions for special shapes.

The Order, the Non-Ferrous Metals Prices (No. 9) Order—Statutory Instrument 1951 No. 2174 consolidates and revokes all earlier Orders in the series. It came into operation on 12 December and is on sale at H.M. Stationery Office.

The new prices for secondary unwrought copper are:—

	£
Ingot bars and wire bars electrolytic	225½
Ingot bars and wire bars fire refined equivalent to H.C.	225½
Ingot bars and wire bars fire refined min. 99.88 copper	225
Ingot bars and wire bars fire refined min. 99.70 copper	224½
Ingot bars and wire bars fire refined min. 99.50 copper	224
Cathodes	224½
All other types and specifications	200

KEEBUSH

Keebush is an acid-resisting constructional material used for the construction of tanks, pumps, pipes, valves, fans, etc. It is completely inert to most commercial acids; is unaffected by temperatures up to 130°C; possesses a relatively high mechanical strength, and is unaffected by thermal shock. It is being used in most industries where acids are also being used. Write for particulars to—

KESTNER'S

5 Grosvenor Gardens, London, S.W.1

NEGRETTI & ZAMBRA
LIMITED
122, Regent St., London, W.1 Reg. 3406

• • •

MANUFACTURERS OF
Industrial instruments for
Indicating Recording and Controlling Temperature, Pressure Humidity, Volume

• • •

Send for our Bulletin B/19 which gives a brief summary of our instrument range

• • •

BRANCHES:—Birmingham, Cardiff, Glasgow, Leeds, Manchester, Nottingham

Agents in most countries overseas

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

APPLICATIONS are invited from **ASSISTANT CHEMISTS** for positions in large Industrial Chemical Research Laboratories in the South of England. Opportunities exist in the fields of Analysis, Inorganic and Physical Research and in pilot plant development. Preference will be given to candidates possessing Intermediate B.Sc. or its equivalent, for some of the positions advertised, whilst a general degree is preferred as a minimum qualification for some of the more senior positions. In either case some experience in industry would be an advantage. Opportunities exist for advancement for suitable applicants. The Company operates a Pension Scheme. Apply **BOX NO. C.A., 3079, THE CHEMICAL AGE,** 154, Fleet Street, London, E.C.4.

APPLICATIONS are invited from **CHEMISTS** for a progressive position in a large **INDUSTRIAL RESEARCH LABORATORY** in the South of England, to study problems connected with the manufacture and use of detergents. The successful applicant should have a good Honours Degree or its equivalent and preferably some experience in the detergent field. The initial salary will be commensurate with qualifications and experience. The Company operates a Pension Scheme. Apply, in writing, to **BOX NO. C.A.3080, THE CHEMICAL AGE,** 154, Fleet Street, London, E.C.4.

FERRANTI, LTD., Edinburgh, have staff vacancies for **GRADUATE INORGANIC** and **PHYSICAL CHEMISTS** to undertake development work in their Vacuum Physics Laboratory which is fully equipped with up-to-date apparatus.

(1) **SENIOR CHEMIST,** with experience in charge of development work, preferably in connection with Ceramics or Powder Metallurgy. Salary range, £800-£1,600 per annum according to qualifications and experience.

(2) **LABORATORY CHEMISTS,** preferably with some experience in Metallurgy, Electro-plating, Micro-analysis or Ceramics. Salary range, £500 upwards, according to qualifications and experience.

These positions offer full scope for initiative and carry good prospects for advancement in an expanding organisation. Contributory Pension Scheme. Apply, quoting 'VPL/C.' and give full details of training, qualifications and experience, in chronological order, to the **PERSONNEL OFFICER, FERRANTI, LTD., Ferry Road, Edinburgh.**

KELLOGG INTERNATIONAL CORPORATION. Engineers with University Degree, and membership in one of the professional institutions, required for Refinery and Chemical Plant projects. Executive status, good commencing salary. Duties would be organisation and planning of project from finalisation of process design through all stages of mechanical design to construction stage. Arrangement of plot plan, specifications for size and type of equipment, instruments, etc., calculation of pipe sizes, arrangement of flow sheets and transmittal of all information to draughting office. Selected candidates would work in London office, travelling at intervals to job sites. Fullest details may be sent in strictest confidence to **PERSONNEL OFFICER, STONE HOUSE, BISHOPSGATE, LONDON, E.C.2,** and should include age, education, qualifications, experience and present salary. All applications will be acknowledged.

SITUATION VACANT

ASSISTANT ENGINEER required by **CHEMICAL ENGINEERING** Firm in London. Qualifications required are: Age about 30; B.Sc. Engineering; above average knowledge of Physics and Thermodynamics essential; good mathematics; understanding of Chemistry desirable; practical works' experience essential; understanding of general office procedure and technical sales an advantage. The position offers excellent opportunities to a man having these qualifications, coupled with a keen business outlook. Write, stating age, qualifications and salary required, to **BOX NO. C.A.3083, THE CHEMICAL AGE,** 154, Fleet Street, London, E.C.4.

FOR SALE

600

PROCESS PLANT

2 **ELECTROSTATIC PRECIPITATION PLANTS** by Siemens Lurgi Cottrell, each with twin insulated collecting chambers containing Electrodes and shaking gear. Chamber dimensions, 62 ft. 6 in. high overall by 11ft. 9 in. by 10 ft. Complete with fan, cyclone and dust collecting and 20 kVA transformer.

2 vert. **GAS COOLERS,** each approx. 12 ft. dia. by 55 ft. high, constructed 12 mm. plate, tile lined and part filled ceramic rings, with water spray diffusers and all fittings, including cool water pumps. Cap. of each Cooler 29,000 M³/hour (1,020,000 cu. ft. per hour), cooling from 220° to 20° C.

3 **AIR FANS** by Carl Encke & Co., type VL6, cap. 15,000 M³/hour (530,000 cu. ft. per hour), end pressure 1.1 atm. (16 p.s.i.), 1,000 mm. (40 in.) water column, 500 mm. (20 in.) i.d. suction, 400 mm. (16 in.) i.d. pressure. Approx. 80 kW (100-h.p.) required to drive.

2 **FANS** by Benno Schilde, cap. 29,500 M³/hour (1,040,000 cu. ft. per hour), 1,000 mm. (40 in.) water column for gas 220° C. Approx. 150-kW (200 h.p. required to drive.

Qty. Parallel Slide **STOP VALVES** for gas and water, Sizes ranging from 65 mm. (2½ in.) to 1,000 mm, (40 in.).

GEORGE COHEN SONS & CO. LTD.
SUNBEAM RD., LONDON, N.W.10
Tel.: Elgar 7222 and
STANNINGLEY, Nr. LEEDS
Tel.: Pudsey 2241

CHARCOAL, ANIMAL AND VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal-insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. **HILL-JONES, LTD.,** "**INVICTA**" **MILLS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL-JONES, BOCHURCH, LONDON," TELPHONE: 3285 EAST.**

FOR SALE

VARIOUS MIXERS FOR SALE

FOURTEEN various open-top **STORAGE TANKS,** riveted, capacities from 300 gallons to 9,800 gallons. Last used for oil or varnish.

1½, 2½ and 3½ size belt-driven **DISINTEGRATORS** by Christy & Norris or Harrison Carter.

Size No. 3 Junior Hammamac **HAMMER MILL** with fan and cyclone, also No. 1 size Miracle **GRINDING MILLS.**

Robinson 3-sheet No. 1 size **CENTRIFUGAL DRESSING MACHINE** for dry powders, etc.

Four **ROTARY BOWL MIXERS,** 5 ft. diam., cast iron built, inclined agitators, by Baker Perkins.

Kek **GRINDING MILL,** square pin type, with grinding discs 13 in. diam., including circular delivery bin with single outlet.

Large unjacketed **WERNER MIXER,** belt and gear driven, hand tipping, double " Z " arms, pans 53 in by 45 in by 36 in. deep.

No. 200 One nearly new **WERNER PFLEIDERER JACKETED MIXER OR INCOPORATOR.** Low type, with C.I. built mixing chamber, 28 in. by 29 in. by 27 in. deep, with double " U "-shaped bottom which is jacketed, and double fish-tail or fin-type agitators geared together at one side, with belt-driven friction pulleys, 34 in. diam. by 5 in. face, with hand-wheel operation and hand-operated screw tilting gear. Machine fitted with machine-cut gears, covers, gear guard, cast-iron baseplate, and measuring overall approximately 7 ft. by 6 ft. by 4 ft. high to the to of the tipping screw.

No. 209 One **HORIZONTAL " U "-SHAPED MIXER,** steel built, riveted, measuring about 8 ft. 3 in. long by 3 ft. wide by 3 ft. 3 in. deep, with horizontal shaft, fitted with bolted-on mixing arms about 18 in. long by 4 in. wide, with intermediate breakers, and driven at one end by a pair of spur gears, with countershaft, fast and loose belt pulleys, outer bearing and plug cock type outlet at the opposite end, mounted on two cradles fitted to two R.S.J. running from end to end.

Two **FILTER PRESSES,** each fitted 68 wood recessed plates, 2 ft. 8 in. square, centre fed, with enclosed bottom corner delivery, cloth clips and belongings.

One **DEHNE FILTER PRESS,** cast iron built, fitted 45 recessed ribbed plates, 2 ft. 8 in. by 2 ft. 8 in. by 1⅜ in., with bottom corner feed, cloth clips and bottom corner separate outlets, angle lever closing gear, etc.

SIMON HORIZONTAL TUBULAR STEAM HEATED DRIER, barrel with steam-heated tubes, 12 ft. long by 5 ft. diameter.

Further details and prices upon application

Write RICHARD SIZER LIMITED, ENGINEERS, CUBER WORKS HULL

THREE **VERTICAL CYLINDRICAL MILD STEEL MIXING VESSELS,** 3 ft. diam. by 3 ft. deep, with adjusters. Little used.

ONE Size D **SIFTER MIXER** by Gardner, 3 ft. 6 in. long with 6 in. diam. brush.

THREE **MONO PUMPS,** unused, each complete with two unused valves. Type TE.4R, Serial No. J/2622/18.

TOPPING & HENDERSON, LTD., 21, FLETCHER STREET, STOCKPORT.
(Tel. : STO 5316 or 2456)

FOR SALE

GRAVITY ROLLER CONVEYOR—8 lengths, 8 ft. long rolls 2½ in. diam. by 18 in. £4 10s. per length. **THOMPSON & SON (MILLWALL), LIMITED, Cuba Street, Millwall, E.14. Tel. : East 1844.**

SCREENLESS PULVERIZERS or fine grinding of Chemicals. Also **CYCLONES, ROTARY VALVE FEEDERS.** Callow (Engrs.) Ltd. Kirkby Trading Est. Liverpool.

PHONE 98 STAINES

TWO-THROW Wet **VACUUM PUMP,** 24,000 lb. per hour.

Unused " **WEIR** " **CONDENSERS.** Brass tubes, 100 sq. ft.

Electric Centrifugal **PUMP,** 200 g.p.m., 43 ft. head, 400/3/50.

Lard Cooling or Film Drying **STEEL ROLLS,** 9 ft. by 4 ft. diam.

" U " **TROUGH MIXERS,** 6 ft. by 2 ft. by 2 ft. deep, 400/3/50.

DISINTEGRATORS, 24 in., 22 in., 18 in. and 12 in. diam. chambers.

Twin " Z " and Fin Blade Jacketed and Unjacketed **MIXERS.**

Autoclaves, Stills, Hydros, Grinders, Pans and Tanks, etc.

HARRY H. GARDAM & CO., LTD., STAINES.

ZINC ASHES, FLUX SKIMMINGS, and other **METAL RESIDUES,** suitable for chemical purposes. Inquiries to **BOX NO. C.A.3066,** THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

1 **DISINFECTOR** by Manlove Alliott, Oval shaped, 30 in. by 50 in. by 7 ft. long I.D. steam jacketed, with bolted doors each end, travelling cage 28 in. wide by 22 in. deep. Pressure 30 lbs. per sq. in. Good condition.

THOMPSON & SON (MILLWALL) LIMITED, Cuba Street Millwall, E.14. Tel. : East 1844.

SURPLUS PLANT
BRAND NEW

3—**SCOTT STILLS.** Horizontal welded steel. 8 ft. 6 in. diam. by 20ft. long. 2" diam. steel tubes.

1—Scott Forced **CIRCULATION EVAPORATOR.** 820-2 in. copper tubes, each 6 ft. long.

11—Copper Tubed Condensers. 300-¾ in. bore tubes, 8 ft. long.

4—Aluminium Tubed **CONDENSERS,** 271-¾ in. O.D. Tubes, 16 ft. 6 in. long. Steel shell, aluminium lined.

5—**CONDENSERS,** steel tubes, brass lined 228-¾ in. bore tubes, 4 ft. 8 in. long.

51—**SPRAY CONDENSERS,** steel shell, with acid-resisting lining.

40 Heavy Aluminium **RECEIVERS,** 8 in. diam. by 1 ft. 4 in. long.

4 " Vitrescent " **EARTHENWARE POTS,** 3 ft. diam. by 2 ft. deep, Acid-proof glaze.

12—**2 H.P. 900 r.p.m. BROOK MOTORS,** flange mounted.

27—**3 H.P. 690 r.p.m. DITTO.**

DETAILS AND ILLUSTRATIONS ON REQUEST

HUBERT JONES LIMITED, COBDEN STREET, PENDLETON, SALFORD 6, LANCS.

PATENTS & TRADE MARKS

KING'S PATENT AGENCY, LTD. (B. T. King, A.M.I.Mech.E., Patent Agent), 146a, Queen Victoria Street, London, E.C.4. ADVICE Handbook, and Consultation free. Phone : City 6161.

WANTED

URGENTLY REQUIRED, AIR COMPRESSORS of all sizes and type, with or without Prime Movers. **BOX NO. C.A.3082, THE CHEMICAL AGE** 154, Fleet Street, London, E.C.4.

SERVICING

ALL CHEMICALS AND DYESTUFFS can be repacked for export by **The East London Chemical Warehouse Co., Ltd., Buxton Street, Stepney, London, E.1.**

CRUSHING, GRINDING, MIXING and DRYING for the trade.
THE CRACK PULVERISING MILLS, LTD.,
Plantation House,
Mincing Lane,
London, E.C.3.

'DOHM LTD., PULVERISING" raw materials everywhere. We have 12 factories. 167 Victoria Street ,London, S.W.1.

GRINDING of every description of chemical and other materials for the trade with improved mills. **THOS. HILL-JONES, LTD., "INVICTA" MILLS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL-JONES, BOCHURCH, LONDON," TELEPHONE : 3285 EAST.**

NEW FLUORESCENT LAMPS FOR OLD !
Your burned out fluorescent tubes refilled for only 7s. 6d. Every refilled tube has a life equal to and is GUARANTEED AS NEW.
QUALPRON (ELECT), 43, CRAWFORD STREET, GLASGOW, W.1.

HYDROGEN PEROXIDE
Concentrated Qualities Dyestuffs & Chemicals
COLE & WILSON, LTD.
24, Greenhead Road, HUDDERSFIELD
Phone: Huddersfield 1993. Grams: 'Colour' Huddersfield

May we quote for
Complete Tar Plants, Tar Stills, Benzol Stills, Autoclaves, Vacuum Drying and Impregnating Plants, Jacketted Pans etc. and for all Steel Plate Work for Chemical Processes.

LEEDS & BRADFORD BOILER Co. Ltd.
STANNINGLEY Near LEEDS

Phone : BLAckfriars 7224 (4 lines)

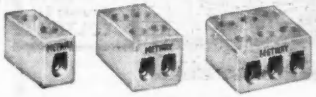
Mitchell Eliminate those worries about fluid-agitation by installing Mitchell mixers. Our range includes models for handling liquids of every consistency in the quickest and most efficient way with the minimum of operational and maintenance costs.

L. A. MITCHELL LIMITED
37 PETER STREET, MANCHESTER, 2
MX.47a

Calcium Chloride
Flake 76/80%
Solid fused 72/75%
Quantities of
up to 20 tons available
for despatch within 3/4 weeks
from receipt of order.

G I SERVICE
A Harris & Dixon Company
Guest Industrials Ltd.
Raw Materials Division
81, Gracechurch Street, London, E.C.3
Telephone: Mansion House 5631 (16 lines)
Telegrams: Guestind, London

MAKING CONNECTIONS



CHINA CONNECTORS

1, 2 and 3-way, 5 to 15 amps.
2-way centre hole, 5 to 15 amps.
1 and 2-way, 30 to 40 amps.

SCRUIT CONNECTORS
4 SIZES AVAILABLE

Please send 6d. for 92 page List OH/31/JJ.3/C.

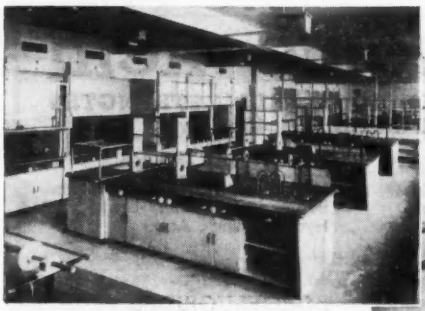
MOULDED TERMINAL BLOCKS

1 to 12 way. 5 to 40 amps.

METWAY ELECTRICAL INDUSTRIES LTD.

KING STREET, BRIGHTON 1

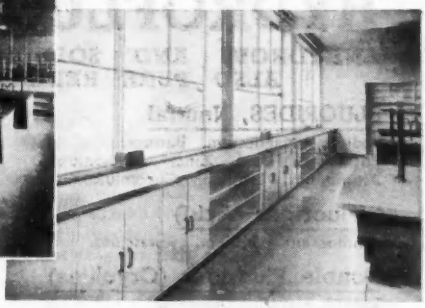
'Phone ; Brighton 28366. 'Grams ; Metway, Phone, Brighton.



Above : Island Type Benches

Right : Wall Type Bench

A recent installation of "CYGNET" Laboratory Furniture and Fittings for a large industrial contract



"CYGNET" Benches, Racks, Fume Cupboards, shelving and other laboratory fixtures are made in a large range of standard units or to specification. Complete installations for Industrial, School and College Laboratories at keen prices.

CYGNET

Laboratory Furniture

THE MARK OF THE CRAFTSMAN

ΦB4

CYGNET JOINERY LTD · HIGHER SWAN LANE · BOLTON · Bolton 1840/4

Acid Resisting Vacuum
EJECTORS
Steam or Water Operated for all Filtration, Evaporation or Distillation Plants.
Lennox Foundry Co. Ltd.
Glenville Grove, London, S.E.8
Specialists in corrosion problems

COTTON BAGS
AND
LINERS for SACKS, BARRELS and BOXES
WALTER H. FELTHAM & SON., LTD.
Imperial Works, Tower Bridge Road, London, S.E.1

IRONAC METAL FOR RESISTING ACIDS
VALVES, TAPS AND CASTINGS
FOR CORROSIVES
HAUGHTON'S METALLIC CO., LTD.
30, St. Mary-at-Hill, London, E.C.3.

HYDROFLUORIC ACID
ANHYDROUS AND SOLUTIONS ALL STRENGTHS
ALSO PURE REDISTILLED 40% w/w

FLUORIDES, Neutral
Sodium, Magnesium, Barium, Potassium, Lead, Zinc, Ammonium, Aluminium Lithium, Chromium.

BiFluorides (Acid)
Ammonium Sodium, Potassium.

Double Fluorides (Cryolites)
Sodium HexafluoAluminate
Potassium HexafluoAluminate

SILICOFLUORIDES
Magnesium, Zinc, Ammonium, Barium, Potassium, Lead, Hydrofluosilicic Acid.

BOROFLUORIDES
Sodium, Potassium, Ammonium, Lead, Copper, Zinc, Cadmium, Fluoboric Acid Solution.

OTHER FLUORIDES TO SPECIFICATIONS.
Glass Etching Acids
Ammonia White Acid and VITROGRAPHINE.

JAMES WILKINSON & SON, LTD.
TINSLEY PARK ROAD, SHEFFIELD, 9
'Phone 41208/9 'Grams "CHEMICALS" Sheffield

"DELANIUM" GRAPHITE
HEAT EXCHANGERS

CORROSION RESISTANCE

"DELANIUM" graphite combines complete resistance to corrosion with thermal conductivity more than twice that of stainless steel or lead.

ROBUSTNESS

The assembly is of robust design and has great strength. The Unit will withstand working pressure differentials of over 200 lbs. per sq. inch.

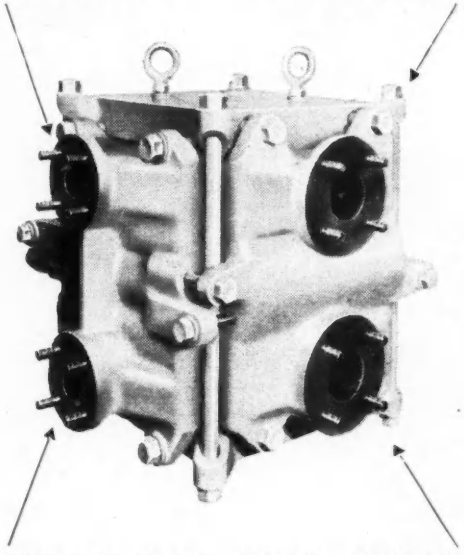
VERSATILITY

Adaptable for use as a condenser, evaporator or heat exchanger.

PERFORMANCE

TYPICAL PERFORMANCE FIGURES FOR MODELS Nos. 3, 5 and 7 ARE:—

Effective Heat Transfer Area	*Total heat transmitted under specific conditions.*
50.0 sq. ft.	*5,250,000 B.Th.U/hr. between steam and a liquid.*
105.0 sq. ft.	*2,200,000 B.Th.U/hr. between two corrosive liquids.*
105.0 sq. ft.	*90,000 B.Th.U hr. between corrosive liquid and gas.*



Model No. 3
Overall Dimensions 15" x 15" x 15"
Heat Transfer Area 50 sq. feet

"DELANIUM" graphite heat exchangers are made from readily obtainable British raw materials and are available in quantity for early delivery.

Full technical data will be given on request and P.D. Chemical Engineers will gladly investigate any corrosion problem to which "DELANIUM" might provide the solution.

POWELL DUFFRYN
CARBON PRODUCTS LTD.

Chemical Carbons Division, Springfield Road, Hayes, Middx.
Telephone: Hayes 3994/8

"STILL LEADING"
For CHEMICAL & ALLIED TRADES
ACID RESISTING
CEMENTS & LININGS
For PICKLING TANKS, FLOORS
DIGESTERS, KIERS,
STONE, CONCRETE,
BRICK, WOOD,
IRON VESSELS
& ACID
TOWERS

PICKLING TANKS 60 FEET LONG WORKING SUCCESSFULLY
AN ALL BRITISH PRODUCT

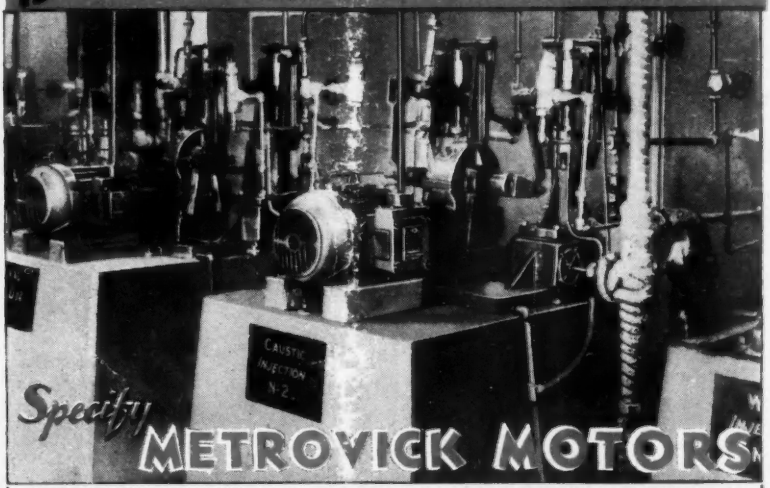
RIZISTAL

RIZISTAL
TRADE MARK

RESISTS
Formaldehyde, Alcohol, Oils, Greases and Tar Acids, Benzene Toluene Compounds HCl, H_2SO_4, HNO_3, and H_3PO_4 mixed HNO_3 and HF Acids, Aqua Regia, Formic, Acetic, Lactic Oxalic, Chromic Acids, Bisulphites, Hypochlorites, Mixed Acids, Peroxides, Nascent Halogens and Alkalies.
UNDER STEAM PRESSURES
SOLE MAKER OVER 50 YEARS' EXPERIENCE

JOHN L. LORD
WELLINGTON CEMENT WORKS
TELEGRAMS: "CEMENT" PHONE: BURY 617
BURY, LANCASHIRE

Driving CHEMICAL PUMPS



Specify METROVICK MOTORS

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., MANCHESTER 17
Member of A.E.I. group of companies.

Printed in Great Britain by THE PRESS AT COOMBELANDS Ltd., Addlestone, and published by BENN BROTHERS LTD., at Bouverie House, 154, Fleet Street, E.C.4. 29 December, 1951. Registered at the General Post Office. Entered as Second Class Matter at the New York, U.S.A., Post Office.